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Original Communications.

*NEW THERAPEUTIC AGENCIES.**

LECTURE IX.—THE NEW MODES OF TREATING TYPHOID FEVER.†

BY PROFESSOR DUJARDIN-BEAUMETZ,‡ PARIS, FRANCE.

GENTLEMEN:—In the last lecture I spoke of the new modes of treating tuberculosis. I shall to-day take for my subject a disease which, next to pulmonary phthisis, is perhaps most frequently observed in ordinary practice: I allude to typhoid fever. In the treatment of this disease considerable progress has been made of late years, as I shall endeavor to show you.

I shall call your attention particularly to the antiseptic treatment of typhoid fever and to the employment of cold baths; and, lastly, to the prophylactic means available, in order to diminish the spread of typhoid fever.

If the knowledge of the *bacillus typhosus*, or bacillus of Eberth, has not yet given a complete explanation of the pathogeny of typhoid fever, it has, nevertheless, enabled us better to understand this affection and better to

* A second series of "New Medications," published in 1887.

† From advance sheets, revised by the author (translated by E. P. Hurd, M.D.). Lectures delivered in Cochin Hospital, Paris, France.

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combat it. As has always been the case in the discovery of the micro-organisms of disease, it is prophylaxis which has most profited by this discovery. We know to-day that the most active instrumentality in the propagation of typhoid fever is the usage of waters which have been fouled by the dejections of typhoid patients, waters which become a culture medium favorable to these micro-organisms. In all the epidemics which we observe to-day, it is always in the water that we find the contagious element; this infectious agent we can cultivate so as to make its presence unmistakable; and in the remarkable discourse which Brouardel recently delivered at the Academy of Medicine (November 11, 1890), during the discussion on depopulation, you will find facts and statistics which make this mode of propagation no longer questionable.

Is this the sole means of propagation of the disease? It will by no means do to affirm this. In an excellent monograph on "Typhoid Fever in the Army,"* Kelsch shows clearly the complexity of the factors concerned in this disease, and the divers conditions in which, either acting singly or in cooperation, they effect their result. To water, so often instrumental in conveying the contagion, we must add the accumulation of organic matters on the floor of barracks or in the holds of vessels; then telluric agencies,—*i.e.*, the influence of the soil,—as when the earth is dug up in the construction of the sewerage-works of cities, and when in army life a large number of soldiers are obliged to camp on the ground. In his remarkable Reports to the Academy, Lardier, of Rambervillers, has instanced undoubted cases of contagion and propagation of typhoid fever where the drinking-water had no agency whatever.

So, then, while recognizing the fact that we have in contaminated water the most important factor of dothinenteritis, we must admit that there are other factors quite as active. Lastly, in order that the bacillus may develop, a favorable culture soil is necessary, and the best is that state of depression of the economy produced by overwork and exhaustion.

I have already had a good deal to say on this subject in my "Prophylactic Hygiene," and I have endeavored to show that if overwork brings about a typhoid condition and favors the development of the *bacillus typhosus*, the presence of the latter is necessary to characterize typhoid fever, and that it is important to distinguish the typhoid states due to overwork from typhoid fever proper, the first being the result of a blood-poisoning,—*i.e.*, the penetration of toxines in the economy,—the second the result of an infection, or rather of a toxic infection, as the *bacillus typhosus* secretes a very active toxine, described by Brieger under the name of *typhotoxine*.

Prophylactic hygiene has utilized all these data, and we see to-day all our cities giving particular attention to the potable water of their inhabitants. This is a matter on which I had something to say in a previous lecture (see THERAPEUTIC GAZETTE, 1889, p. 365).

From these data, which may be now considered as facts of science, there flow certain practical consequences to both public and private hygiene. Public hygiene is enlightened thereby as to the necessity of furnishing pure water to the inhabitants of towns and cities. As for the application of these facts to private hygiene, individuals everywhere recognize, or should recognize, the obligation to destroy as promptly as possible the dejections of persons affected with typhoid fever, and to disinfect all places fouled by these dejections.

So, whenever you are in the presence of a case of typhoid fever, you should formulate a series of precautions, to be rigorously observed by those whose business it is to attend on the sick, or to be much with them. For the disinfection of the stools, I would recommend particularly the sulphate of copper, of which you will have two solutions,—one strong, the other weak. The strong solutions contain 50 grammes (about 1⅔ ounces) to a litre (about 1 quart) of water; the weak, 12 grammes (about 3 drachms) to the litre. The first will serve for the stools, and you will see that the vessel which receives the dejections shall always contain a certain quantity of this solution. This same solution will serve, moreover, for the disinfection of soiled linen, and for the purification of the water-closets.

The weak solution will be utilized for washing the hands and face of those who take care of the patient, as well as the parts of the cutaneous surface of the patient which have been fouled by his dejections. You will recommend to the nurses and attendants not to eat in the sick-room. You will also advise them to wash their hands whenever they touch the

* *Revue d'Hygiene*, August and September, 1890.

patient. Lastly, it will be necessary to send to the disinfecting stoves (heated by steam under high pressure, which the municipalities are endeavoring to establish to day in the different cities) all objects which have been in contact with the patient.

When people are not sure of the purity of the water which they drink, they ought to boil it, or use the sterilized water of commerce, which, owing to the facilities for its production, may be now procured at a very low price. Apparatuses for the sterilization of water are now very common; one kind much in use is portable, and can be transported at any time to the centre of an infected district.

I do not speak of filtered water, and for this reason. The cylindrical water-filters (called Chamberland filters) constitute an immense progress towards the obtention of water of absolute purity; but it is not enough to have simply the Chamberland filter; it must be perfectly well made, and free from all cracks and pores. These filters must, moreover, be kept perfectly clean,—*i.e.*, exposed to a hot fire every week or two,—a precaution rarely observed by persons who possess them, and who, confiding in the assertions of the dealers, believe that it is not necessary to cleanse the filter to have healthful water, which is a mistake. Lastly, there is a question much more grave,—Do these filtering "bougies," which oppose the passage of microbes, offer a sufficient barrier to the toxines secreted by the microbes? This point has not yet been well demonstrated.

Boiled water presents none of these evils. Boiling destroys both the microbe and the toxines. It has been asserted that these boiled waters are indigestible; this objection has really little validity, and a recent work of Guinard has made this clear.* Guinard has shown that boiling really lowers the hydrotimetric † degree of the water of the Rhone and the Saône, but without depriving these waters of all their calcareous principles, though it does this with well-waters; but here it is an advantage, as boiling rids the water of its carbonate of lime. Moreover, the following table shows you these differences:

Source of the water.	Hydrotimetric degree. Before boiling.	After fifteen minutes of boiling.	Difference.
Rhone water delivered at Lyons	15.5°	12°	3.5°
Saône water	16°	11°	5°
Well-water	52°	34°	18°

As for the gases of the water, ebullition, even when prolonged, does not completely expel them, and, moreover, the water very rapidly recovers these gases. The following figures, borrowed from Guinard, show this.

Before the action of the heat, 100 cubic centimetres of Rhone water contained 5.4 c.c. of gases, resolvable into

	C.c.
Carbonic acid	1.1
Oxygen	1.3
Nitrogen	3.0

After forty-five minutes of boiling, this water contained, still after cooling, 1.9 c.c. of gases, found to be

	C.c.
Carbonic acid	0.3
Oxygen	0.5
Nitrogen	1.1

The same water, after twenty-four hours of exposure to the air in an open place, had absorbed a new quantity of gases, and contained

	C.c.
Carbonic acid	0.3
Oxygen	1.1
Nitrogen	3.5

You see, then, that boiled water may redissolve a certain quantity of gases which it takes from the surrounding air. You see, moreover, that by prolonged boiling it is impossible to deprive water completely of its gases. So, then, in cases of doubt, advise the use of boiled water or of sterilized water.

I come now to the study of the new ways of treating typhoid fever.

The putridity of the intestines plays a considerable *rôle* in typhoid fever, and the denomination of *putrid fever*, formerly given to this affection, is perfectly correct in the light of modern researches.

This putridity results from the particular state of the digestive tube and the numerous ulcerations which develop there, resulting sometimes even in sphacelus of a portion of the mucosa. Hence the fetidity of the stools is a constant characteristic of typhoid fever. Physicians, of late years, have tried hard to counteract this putridity, and we are especially indebted to Bouchard for enlighten-

* Guinard, *Lyon Médicale*, August 10, 1890.

† The *hydrotimeter* is an apparatus for the qualitative and quantitative analysis of water. It determines the quantity of lime salts by the aid of a solution of soap (Robin).—Tr.

ment as to the best means of intestinal antisepsis in typhoid fever.

Various agents have been tried. Bouchard first proposed charcoal, then iodoform, then naphthalin, finally naphthol, and it must be admitted that the latter agent is much superior to those first mentioned.

There are, as you know, two kinds of naphthol,—one more soluble, less toxic, but more irritant, α naphthol; the other, less soluble, more toxic, but less irritant,—viz., β-naphthol. It is to the latter that Bouchard has given the preference, and he associates the naphthol with salicylate of bismuth, under the form of powders or granules, and gives them in such a way that the patient shall take daily from fifteen to thirty grains of naphthol.

To day, in my judgment, naphthol should be abandoned, and salol substituted in its place, and for this reason: Naphthol is always irritant; is often badly borne. Salol, on the contrary, is much better tolerated. Moreover, this salicylate of phenol is a medicament which is not decomposed until it reaches the intestines. It is the disinfectant *par excellence* of the intestines, and has been so far useful from this point of view, as in patients afflicted with artificial anus, to do away with one of the most serious inconveniences attending that infirmity by destroying the odor of the fæcal matters constantly flowing through the fistulous opening. It is, then, to salol that you should resort, and I add that salol is but slightly toxic.

In some experiments made in 1887 with Dubief, and detailed in the thesis of my pupil, Dr. Lombard,* we demonstrated that it is necessary to give to a rabbit salol in the proportion of one gramme per kilogramme of weight to produce death.

Salol has an odor which is sufficiently agreeable; not being soluble, it has no savor; and you can administer it in capsules, or, what is better, in suspension in an appropriate vehicle. The quantity to be given in the twenty-four hours should be between 2 and 4 grammes (½ to 1 drachm). You can add, if you wish, salicylate of bismuth.

To practise disinfection is not enough. You must also combat the febrile element, and this is one of the most interesting and important points in the question before us. During the last few years a great number of active antipyretic agents have been discovered, which constitute that series of antithermic medicines of which I have so often spoken. These medicaments have been applied to the treatment of typhoid fever, and we see a great number of our *confrères* attribute to them a real value. I confess that I cannot share this confidence.

The hyperthermia in dothinenteritis is but one manifestation of the general state of the patient, and to believe that in lowering the temperature you are going to get rid of the gravity and intensity of the disease is a profound mistake. We see, on the one hand, very grave cases of typhoid fever without hyperthermia; and, on the other hand, we can, by our antithermic medicines, keep down the temperature of the patient to the normal during the entire course of the disease without diminishing for an instant the gravity of the affection. If I add that the most of these antithermics diminish the urinary secretion, and thereby oppose the elimination of the toxines which are produced in so great quantity by the febrile state, we shall have, I believe, sufficient reasons to be very reserved in the administration of these antithermic analgesics in typhoid fever, and I fully agree in this respect with Cantani in his communication made to the Berlin Congress.†

Ought we to have the same reserve in respect to the employment of cold baths,—of tepid baths? As for cold baths, I have many times given my conclusions as to their therapeutic value, both in my "Clinical Therapeutics"‡ and in this journal,§ and the recent facts which our colleagues of the hospitals have communicated, and in particular Juhel-Renoy, Merklen, Josias, etc., have not modified my opinion.

The cold bath is a good therapeutic agent; it not only opposes the hyperthermia, but especially the disturbances of the nervous system. What I have especially combated is the systematization of Brandt's method; and I shall return to this point by and by when I come to speak of the statistical results of the different methods of treatment employed.

If you do not see me prescribe cold baths as a routine measure of practice in my hospital, it is because I find in lotions, wet packings, and especially in tepid baths, the same advantages as in cold baths, without the inconveniences of the latter. Tepid baths constitute an excellent method of treatment in

* "Researches on Salol" (*Thèse de Paris*, 1887).

† Cantani, Congress of Berlin, 1890, and *Bulletin Général de Thérapeutique*, t. cxiv., 1890.

‡ "Clinical Therapeutics," Detroit ed., art. "Typhoid Fever."

§ THERAPEUTIC GAZETTE, 1887, p. 803.

typhoid fever, and by tepid baths I mean such as have a temperature of 30° to 32° C., and present a difference of about 10° from the body temperature of the patient. I obtain with these tepid baths sedation of the nervous disturbances, a sufficient fall of the temperature, and a state of freshness of the skin, and general comfort, which enables the patient to get the needed rest. This is the order that I generally follow when prescribing baths and ablutions:

I begin by lotions; then, if the temperature exceeds 40° C., I give tepid baths, one or two a day, according to the thermometric indications; the duration of the bath should be from twenty to thirty minutes, and, when the patient is feeble, I give him stimulating drinks while he takes his bath. If a very intense ataxo-adynamia supervenes, I wrap the patient in a wet sheet. The duration of this wet-wrapping should never exceed thirty seconds.

To terminate what pertains to the fever, I shall speak of sulphate of quinine and of benzoate of sodium. Of all the medicaments applied to typhoid fever, sulphate of quinine has the best withstood the attacks which have been made against the pharmaceutical treatment of this disease.

If we have abandoned the large doses of quinine and content ourselves with only medium doses, amounting to one gramme per day, we none the less consider quinine as one of the best medicaments ever used in typhoid fever; and we see certain of our colleagues, Grancher in particular, maintain that the salts of cinchona have an action really specific in dothinenteritis, especially when this disease affects children. I do not altogether adopt this view. At the same time I recognize that quinine is a medicine which finds its place in a great number of cases of typhoid fever.

Albert Robin has shown himself the most earnest advocate of the use of benzoate of sodium in typhoid fever. He has, in fact, proposed a new theory of typhoid fever based on the following circumstances: In typhoid fever there is not augmentation but diminution of the oxidations, with exaggeration of organic disintegration. The oxidations, as I have said, are lessened, and this hinders the combustion or modification of the waste matters which result from the increase of the disintegration. Moreover, the different emunctories being affected, the toxines and the waste elements of disintegration encumber the economy. According to this theory, the crises, favorable or unfavorable, result from either the more active elimination of these products or their retention. Hence, all medicaments which are capable of energizing the combustion of the organic *débris* should be advised.

Robin mentions especially salicylic and benzoic acids; he gives daily 30 grains of benzoic acid or 60 grains of benzoate of sodium. I do not know that the method of our colleague has come into very general use, and if salicylic acid and the salicylates are still prescribed, it is rather that they may act as disinfectants. As for benzoic acid and its derivatives, it is but little employed.

All these means of which I have just spoken may furnish two orders of therapeutic agencies,—the one systematic,—*i.e.*, applicable to all cases; the other, to be applied according to indications.

Certain authorities have systematized the cold baths; others, like Bouchard, antisepsis, with the tepid baths; others employ only the salicylate of bismuth, etc. I am a thorough opponent of systematization.

For a disease like typhoid fever, which presents itself under the most variable forms, we cannot admit a therapeutic formula which applies indiscriminately to all cases, and our treatment should vary according to the patient whom we have before us. We may truly say that there is no treatment of typhoid fever, but a treatment of typhoid patients, and this I shall endeavor to prove to you by the recent statistics furnished by the practice of our Paris hospitals.

In a very interesting communication made by Merklen* to the Society of the Hospitals, on the results of the divers treatments of typhoid fever in the hospitals of Paris, you will find statistics of great value, and the first point to which I would call your attention is that, taken in its entirety, the mortality varies according to the periods; sometimes it rises, sometimes it falls. Thus, in the period extending from 1868 to 1882, the mortality in the hospitals from typhoid fever was twenty-one per cent. From 1882 to 1888 it fell to fourteen per cent., and in 1889 it was thirteen per cent., and this whatever kind of treatment was employed. We may even say that in 1890 it is still lower, being not more than twelve per cent.

This mortality does not affect equally both sexes, and, as Hayem has remarked, the figure

* Merklen, "The Treatments and the Mortality of Typhoid Fever in the Hospitals of Paris" (*Bull. et Mém. de la Soc. des Hôp.*, July 9, 1890, p. 628).

of the mortality of women is much larger. Juhel-Renoy makes this difference,—viz., twelve per cent. for women, five per cent. for men. The mortality of women, then, is more than double that of men.

Has the treatment, then, any influence on this fall of mortality? The difference is very slight, that is as far as our hospitals are concerned.

If we take as the basis, for instance, the year 1889, we find for the total mortality,—military hospitals, general hospitals, and children's hospitals,—with the symptomatic treatment, 11.33 per cent.; and with the systematic treatment by cold baths, 11.28 per cent. The lowest mortality was obtained in 1889 by the combined employment of quinine and tepid baths, being 7.33 per cent. But Debove has shown how careful we should be in in drawing such conclusions, since by almost absolute expectancy, only a hygienic treatment being employed, the practitioner at the Hospital Andral has had a mortality of only 9.2 per cent.*

Moreover, in a recent communication, Merklen has brought clearly to view a fact on which I had long dwelt in my "Clinical Therapeutics,"—viz., the difficulty of basing therapeutic conclusions on statistics, and you will permit me to repeat what I said ten years ago in the first edition of that work. After citing the remark of Forget,—"Statistics are like an obliging girl, who gives herself up to the first comer,"—I added, with reference to typhoid fever, "Do you believe that one typhoid patient is exactly like another typhoid patient?" The age of the patient, the state of his vital forces, the relative severity of the epidemic, the period of the year, the nature of the locality even, have a great influence on this pathological aggregate, and modify its march and its fatality. It is here especially that we see the influence of what I have called the morbid genius of epidemics, where one sees epidemics relatively benign succeed epidemics that were relatively malignant; and according as you employ the same method of treatment to the first or to the second, you will have multiplied successes or failures.†

I find a confirmation of these views in the discussion which took place at the Society of the Hospitals, where Merklen showed the variations of the mortality according to epidemics.‡

With regard to this variable mortality of epidemics of typhoid fever, is it in contradiction with the recent data which we have acquired concerning this disease? By no means. What, in fact, does bacteriology show us? It puts in clear light this fact, that the virulence of the products secreted by the microbes is variable according to multiple circumstances, and it is probable that under certain conditions, of which the knowledge still escapes us, the *bacillus typhosus* acquires extraordinary virulence. If, we add, in accordance with the teachings of Koch, the gravity varying according to the soil on which this microbe is cultivated, debility of the organism, overwork and exhaustion, insufficiency of alimentation, etc., we shall have the explanation of this variation in the mortality by typhoid fever, which we have before ascribed to the "morbid genius," confessedly a vague and indeterminate word.

What conclusions shall we draw from all this? This,—namely, that nothing in the facts of the case warrants the advocates of systematic medications in affirming the superiority of their method over the symptomatic modes of treatment, and that here, as in many other things, it is the attention which the physician shall give to the patient whom he treats, it is the promptness and the rigorousness with which the treatment shall be applied, it is the celerity with which he shall combat the varied symptoms which appear in the course of typhoid fever, which constitute the success of the treatment employed, whether the latter be systematized or not.

But, however important the part which you may assign to this systematization, do not forget that there are still three elements of success which ought always predominately to enter into your therapeutics,—the disinfection of the intestinal contents, the promotion of an abundant diuresis, and a most scrupulous attention to the hygienic needs of the patient.

As to the first point, I need not repeat what I have already said. Salol is the medicament which seems to me best to fulfil this indication.

As for the matter of diuresis, I adopt in this regard the views of Albert Robin, and believe that it is useful to favor as much as possible the elimination of the products of

* Debove, "On the Mortality from Typhoid Fever" (*Bulletin et Mémoires de la Société Médicale des Hôpitaux de Paris*, July 25, 1890).

† "Clinical Therapeutics," G. S. Davis, Detroit, Mich., p. 381.

‡ Merklen, "The Variations in the Mortality of Typhoid Fever" (*Bull. et Mém. de la Soc. Méd. des Hôp.*, October 30, 1890).

organic disintegration ; and as the most active channel for this elimination is the kidney, it is necessary to give our patients abundant drinks to favor diuresis. I believe even that the success obtained by Debove by expectancy is due to the fact that he always requires his patients to drink abundantly. Unhappily, in grave cases, the bad condition of the mouth, and the fuliginosities which encumber it, joined to the state of prostration and delirium into which the patient is plunged, often render the administration of beverages very difficult. The drink which I prefer is fresh vinous lemonade, which may be iced if one wish.

Lastly, this great question of hygienic attentions dominates the entire therapeutics of dothinenteritis, and explains the marked difference which exists between the mortality of the hospitals and that of private practice. Despite the painstaking and devotion of our hospital nurses and attendants, it is impossible to give our patients in those public institutions the scrupulous attention which we can exact in private practice, especially among rich people. In private practice, such factors as the ablutions, the constant cleansing of the mouth, the disinfection of the excreta, the excellent ventilation of the sick-room, the plentiful supply of nurses,—new and fresh ones taking the place of those that are tired out, and the patient never being left an instant unattended, —all this constitutes so many chances of success, which give the patients of the better classes in private practice the advantage over hospital patients.

Such are the considerations which I desired to present in connection with the treatment of typhoid fever. They show on this special point the indubitable progress of therapeutics. In the next lecture, which will finish the conferences of this year, I shall take up a subject on which there has been a great deal of discussion of late, and which may be considered as being yet far from settled. I refer to "Hypnotic Suggestion in Therapeutics."

A STUDY OF THE PHYSIOLOGICAL ACTION OF KAVA-KAVA.

By David Cerna, M.D., Ph.D., Philadelphia, Pa.*

THE plant known by the names of ava, kawa, yagnona, ava-ava, kara, kava, and kava-kava is the *Piper methysticum*, of the natural order of *Piperaceæ*. It is cultivated in the Fiji, Hawaiin, and other islands. While several varieties are known to the natives, the most active properties are exhibited by those species of the plant which grow on dry soil.

The plant possesses stimulating but not, as has been frequently stated, intoxicating properties. The preparation used by the natives is made exclusively from the root. As such it is said to possess, like coffee, a primary stimulating effect. Kesteven† has remarked : "A night's carouse, however, from kava-kava, as frequently indulged in by the natives, impairs the function of locomotion, and you have the curious spectacle of a man utterly drunk in his walk, while his intellect is unclouded ; he is unable to control the movements of his legs, but is perfectly aware of his disability. When the effects have passed off, there remain no after-consequences,—*e.g.*, 'hot coppers,' 'sore heads,' are unknown as a result of kava-drinking."

The first investigator to make a study of the racine of kava-kava was Morson.‡ Ignorant of his observations, Guzent, Gobley, and O'Rorke,§ years later, made a study of the same racine. But the first observer to present a more or less thorough analysis of the kava resin was Gobley, ‖ who gave to the active principle of the drug the name of *methysticin*.

Dupuy,¶ in a recent thesis, has stated that the kava plant contains a resin which seems to constitute its essential therapeutic principle.

Besides a crystalline, non-nitrogenous substance, designated as *kavahin*, extracted from the *Piper*, a second body has been determined by Noelting and Kopp,** which appears to be the same as the one worked out by Lewin.††

According to Guzent,‡‡ the root of the kava, of which nearly half of its weight is made up of starch, contains an essential oil of a pale yellow color, two per cent. of an acrid resin, and about one per cent. of a neu-

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* Assistant in Physiology in the University of Pennsylvania.

† London *Practitioner*, 1882; also Therapeutic Gazette, May, 1882.

‡ London *Pharmaceutical Journal and Transactions*, 1844, p. 472.

§ *Journ. de Pharm. et Chemie*, 1860, vol. xxxvii. p. 20.

‖ Loc. cit.

¶ *La Tribune Médicale*, April 13, 1879.

** *Le Moniteur Scientifique*, vols. xvi., 3d Series, and iv., 1874, p. 920.

†† *Berliner Klinische Wochenschrift*, January 4, 1886.

‡‡ Therapeutic Gazette, April, 1881.

tral crystalline principle called ***kavahin*** or ***methysticin***, which is obtained in acicular crystals by crystallization from a concentrated tincture. This principle is said to differ from cubebin and piperine in its being colored red by hydrochloric acid, which color fades into a bright yellow on exposure to air, and also in being colored purplish violet by strong sulphuric acid, this passing subsequently into green.

The body produced by Lewin was the one termed by him *yangonin*, and is said to be also free from nitrogen.

Lewin has found both substances—*kavahin* and *yangonin*—inactive by themselves. But to a resinous body, *alpha-kava*, extracted from the root by means of alcohol, and which contains both principles, he ascribes the active qualities of the drug.

Randolph* ventures to call this alpha-kava of Lewin, *lewinin*. The effects of this resin are similar to those produced by the crude plant.

Again, it has been observed that a watery infusion of the drug produces the same characteristic effects, so that the medicinal properties of kava-kava are due neither to the resin alone nor to the other chemical constituents.

From the chemical evidence so far brought forward, imperfect as it is, it may fairly be stated that no true active principle has yet been isolated from kava-kava, the composition of which certainly requires further and more thorough investigation.

PHYSIOLOGICAL ACTION OF KAVA-KAVA.

General Action.—For purposes of experimentation I have employed exclusively the fluid extract of kava-kava, an excellent preparation furnished by Messrs. Parke, Davis & Co., of Detroit, Mich.† From my own, and from the general experiments of Lewin, Dupuy, and Randolph, the following effects are noticed: Taken internally or through hypodermic injections, the drug produces an increased flow of saliva, a burning sensation in the mouth, followed by a marked numbness, a general depression of nearly all the normal functions, and lastly paralysis, this being most noticeable in the hind extremities, especially in the case of the frog. In a completely paralyzed batrachian, under the influence of the drug, mechanical, thermal, chemical, or electrical irritations produce no effect; although in every case, after death, faradization of both nerves and muscles produces the corresponding contractions, showing that these tissues remain unaffected. Simply placed on the tongue, the drug produces a momentary burning sensation, with increased secretion of saliva, which is soon followed by a local numbness, lasting for over an hour. After a short time the increased secretion of saliva and the decreased sensibility of the mucous membrane of the mouth and throat cease. The same results are observed on the conjunctiva and cornea. When the drug is directly applied to these parts, sensibility is lost in a very short time, and this condition, which allows the eye to be irritated and even scratched without the animal evincing any signs of pain, lasts for a considerable time.

The great muscular weakness observed in the higher animals, under the action of the poison, is undoubtedly of spinal origin, as the superior nerve-centres retain, in these circumstances, their normal functional activity, especially in the case of man.

Moderate quantities produce stimulating effects, especially on the central nervous system. Small and larger doses depress the circulatory system; and, finally, in sufficiently poisonous amounts, kava-kava produces death through failure of the respiration or through cardiac paralysis, especially the former. (See Experiments 12 and 20.)

To obtain a more accurate knowledge of the subject, I shall proceed to make a study of the action of the drug on the different systems separately.

ON THE NERVOUS SYSTEM.

On the Sensory Nerves.—One of the most characteristic effects produced by kava is the loss of local and general sensibility. This comes on soon after the injection of the poison, but in a certain period of time it completely disappears, even when the muscular weakness or paralysis is still noticeable. The local anæsthesia produced around the point of injection, however, persists for a long time after the disappearance of all other symptoms.

The following experiments explain themselves:

Experiment 1.—Large frog. Injected hypodermically, at 3.30 P.M., 5 drops of fluid extract of kava kava; 3.50, sensation very much impaired and animal lies perfectly paralyzed; 3.55, continued in the same way; 4, sensibility is better, but paralysis is still complete; 4.20, sensation normal, as tested by simple

* *Medical News*, March 13, 1886.

† The drug was kindly placed at my disposal by Dr. S. Weir Mitchell and Professor H. A. Hare.

mechanical irritation, but the batrachian will lie in any position that it is placed.

Experiment 2.—Pup; weight, 10 pounds. Administered subcutaneously 2 drachms of fluid extract of drug at 1.15 P.M.; 1.30, animal exceedingly weak; sensation impaired; 1.45, lies perfectly paralyzed on one side; the animal, though severely pinched on any portion of the body, gives no evidence of pain; respiration slow and deep, and has a peculiar to-and-fro motion of his head; 2.30, continues weak and drowsy, but the loss of sensibility begins to disappear; 4.30, continues in the same paralyzed condition, but sensation appears normal now, as cries are elicited on being pinched. By 9 A.M. next day the pup had completely recovered, but in a small area around the point of injection the numbness was yet pronounced, as there the animal would bear severe pinching, and even burning, without evincing pain.

Experiment 3.—Medium-sized frog. Tied abdominal aorta, and waited for shock to pass off. 10.40 A.M., injected into anterior portion of body 10 drops of fluid extract of kava-kava; 10.50, the batrachian lies perfectly flaccid, and while local irritation of hind legs produces reflex movements, the same, applied to fore extremities, elicits no response; 11.25, complete general paralysis, but sensibility is apparently intact only in posterior extremities.

These experiments were frequently repeated, and similar results obtained. The drug, again, produces a decided anæsthesia of the mucous membrane of the mouth and throat, and of the conjunctiva and cornea, when locally applied.

Randolph* has stated that *lewinin* produces a prolonged local anæsthesia of the conjunctiva, especially after the use of cocaine.

All this evidence would seem to show that kava-kava affects decidedly the afferent or sensory nerves, especially their peripheral ends.

Reflex Action.—Kava-kava, in moderate and large doses, diminishes and finally destroys reflex action. This phenomenon is even observed in the lower extremities after previous ligation of the abdominal aorta. Again, reflex activity is diminished as quickly in the normal animal as in the one whose spinal cord has been previously severed high up.

The following experiments, which were variously repeated, show this:

* Loc. cit.

Experiment 4.—Frog. Destroyed brain, and, after the shock had passed, reflex action, as tested with acidulated water, was manifested in ten seconds. At 1.20 P.M. gave hypodermically 5 drops of fluid extract of kava-kava; 1.30, reflex action in thirty seconds; 1.35, reflex action in thirty seconds: 1.40, reflex action in twenty seconds; 2.30, reflex action in twenty seconds.

Experiment 5.—Large frog. Ablated cerebrum and tied abdominal aorta. After shock had passed, reflex action was shown in five seconds. At 1.5 P.M. injected 15 drops of fluid extract of kava-kava. 1.10, reflex action in twenty-five seconds; 1.12, reflex action in thirty seconds; 1.30, reflex action in one minute; 1.40, no reflex action in two minutes.

Experiment 6.—Two frogs—*A* and *B*—of equal size were used. *B* had cord cut high up, and waited for disappearance of shock. Both received into abdominal cavity the same dose—10 drops of the fluid extract of kava—at 2.35. Before injection, *A* showed reflex action in eight seconds, *B* in three seconds; 2.40, reflex action in *A* in ten seconds, in *B* in six seconds; 2.45, reflex action in *A* in fifteen seconds, in *B* in ten seconds; 3, reflex action in *A* in thirty seconds, in *B* in twenty-five seconds.

Experiment 7 gave similar results.

The fact, again, that neither muscles nor motor nerves are affected by the drug shows that reflex action is lowered, and finally abolished, through an action upon the sensory nerves and the spinal cord, chiefly the latter.

Paralysis.—The immediate and very pronounced paralysis produced by kava-kava, especially upon cold-blooded animals, is a constant effect.

It has been shown that this condition continues for a long time, even after general sensibility has been regained. As previous ligation of the abdominal aorta does not prevent the usual effect, it is evident that the paralysis is not due to a peripheral influence.

After death, both muscles and motor nerves respond readily to electrical stimulation, but the same faradic current applied directly to the exposed cord produces either very slight muscular contractions or none at all. These latter results are more noticeable when the drug is placed locally upon the spinal cord itself.

The following experiments—examples of many others performed—sufficiently explain themselves.

Experiment 8.—Large frog. Destroyed brain and tied abdominal aorta. The shock having passed, injected in another portion of body 10 drops of fluid extract of kava-kava at 4.10 P.M; 4.15, movements exceedingly sluggish; 4.20, complete general paralysis ensues; 5.30, animal is dead. Carefully exposed spinal cord and applied electrical stimulus, but no response was elicited; the same current applied to nerve-trunks produced powerful contractions of tributary muscles; these likewise proved to be intact.

Experiment 9.—Medium-sized frog. Ablated cerebrum and carefully exposed spinal cord. After shock had passed, the cord responded very readily to weak faradic current. At 3.15 P.M., applied locally to medulla spinalis a few drops of the fluid extract of kava-kava; 3.40, animal is completely paralyzed; 3.45, muscles and nerves respond to moderate faradic current, but the same, and even very strong ones, applied directly to the cord, *fail entirely* to produce any effects.

The paralysis, then, produced by kava, is of spinal origin, and is due undoubtedly to an action of the drug upon the cord.

ACTION UPON THE CIRCULATION.

The action of kava-kava upon the circulation is very decided. Small, moderate, and large doses produce in the normal animal the same phenomena as regards the rate of the cardiac beat and the arterial pressure. Both are considerably diminished. In order to study how these changes are brought about, I shall consider the action of the drug upon the pulse and blood-pressure *seriatim*.

On the Pulse.—In all the normal experiments the reduction in the number of heart pulsations was found to be a constant effect. After small and moderate amounts, the cardiac rate gradually returns, in a short time, to the normal condition, but never goes above this. Under large and poisonous quantities, the reduction, with slight variations, is progressive until the occurrence of death.

It was observed, however, that notwithstanding the diminution in the rate of the pulse, the heart-waves were, in every instance, considerably larger, showing a decided cardiac stimulation.

This pulse diminution may be observed in the following experiments: (See Fig. 1.)

FIG. 1.

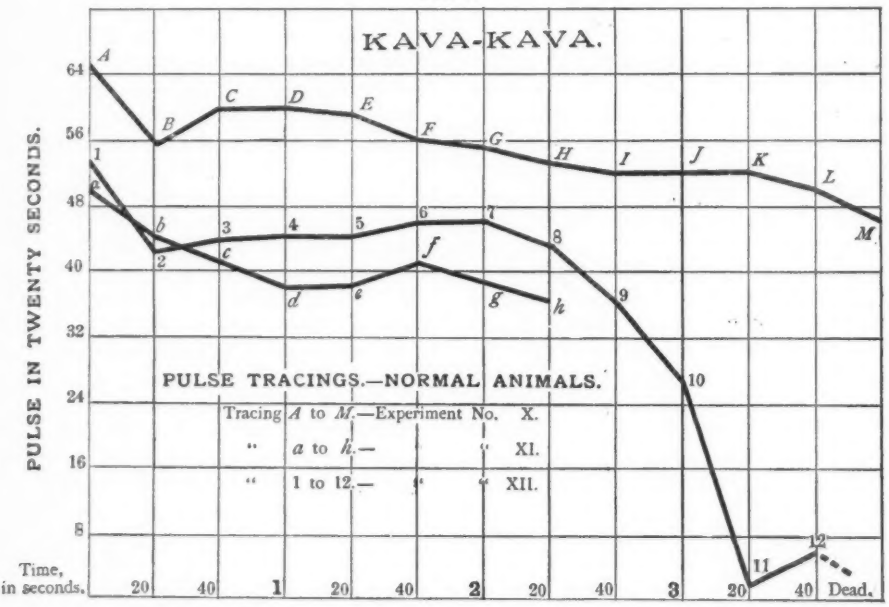


TABLE I.—*Experiment* 10.—Animal, dog; weight, 5 kilos.

Time. h. m. s.	Pulse in 20 secs.	Dose.	Remarks.
2.15.20	63	.....	Normal animal.
2.15.40	65	.....	
2.16	65	1 millilitre.	Injected into external jugular.
2.17	56	.....	
2.17.20	60	.....	
2.17.40	60	.....	
2.18.20	59	.....	
2.18.40	56	1 millilitre.	Second injection.
2.19	55	.....	
2.19.20	53	.....	
2.20	52	.....	
2.20.20	52	.....	

Time. h. m. s.	Pulse in 20 secs.	Dose.	Remarks.
2.20.40	52	1 millilitre.	Third injection.
2.21	50	.....	
2.21.05	46	.....	Animal dead.

TABLE II.—*Experiment* 11.—Animal, dog; weight, 3 kilos.

Time. h. m. s.	Pulse in 20 secs.	Dose.	Remarks.
10.10.20	54	.....	Normal animal.
10.10.40	50	1½ millilitres.	Injected into external jugular.
10.11	45	.....	
10.11.20	41	.....	Respirations exceedingly shallow.
10.11.40	38	.....	
10.12	38	.....	
10.12.20	41	.....	
10.12.40	39	.....	
10.13	36	.....	
10.13.15	...	.....	Animal dead; respiration and heart stopped at the same time.

TABLE III.—*Experiment* 12.—Animal, dog; weight, 5½ kilos.

Time. h. m. s.	Pulse in 20 secs.	Dose.	Remarks.
12.45.20	50	.....	Normal animal.
12.45.40	53	7 millilitres.	Injected into jugular.
12.46	43	.....	
12.46.20	43	.....	Respiration stopped.
12.46.40	43	.....	
12.47	44	.....	
12.47.20	44	.....	
12.47.40	46	.....	Eye reflexes gone.
12.48	46	.....	
12.48.20	43	.....	
12.48.40	36	.....	
12.49	26	.....	
12.49.20	2	.....	
12.49.40	6	.....	
12.50	...	.....	Animal dead.

TABLE IV.—*Experiment* 13.—Animal, dog; weight, 20 kilos.

Time. h. m. s.	Pulse in 20 secs.	Dose.	Remarks.
10.10	66	.....	Normal animal.
10.10.20	66	.....	
10.10.40	66	.....	
10.11	60	.....	
10.11.10	...	4 millilitres.	Injected into external jugular.
10.11.30	54	.....	
10.11.50	60	.....	
10.12.10	60	.....	
10.12.30	52	.....	
10.12.50	59	.....	
10.13.10	57	.....	
10.13.30	57	.....	
10.13.35	...	4 millilitres.	Second injection.
10.13.55	47	.....	Respiration stopped.
10.14.15	55	.....	
10.14.20	...	.....	Stopped drum half a minute.
10.15	55	.....	
10.15.45	34	.....	Stopped drum half a minute.
10.19.45	...	.....	Heart stopped; animal dead.

No appreciable effect is produced by kava-kava on the rate of the cardiac beats, after previous section of the pneumogastric nerves, nor after division of both cord and vagi. Of several experiments performed, all of which gave identical results, I only record the following two: (See Fig. 4.)

TABLE V.—*Experiment* 14.—Animal, dog; weight, 10 kilos.

Time. h. m. s.	Pulse per min.	Dose.	Remarks.
12.10.20	189	.....	Vagi cut; canula introduced into trachea; waited ten minutes before injection.
12.10.30	.....	2 millilitres.	Injected into external jugular.
12.11.10	195	.....	
12.11.30	181	.....	
12.11.50	189	.....	
12.12.10	186	.....	
12 12.30	192	.....	
12.12.50	186	.....	
12.13.10	189	.....	
12.13.30	186	.....	
12.13.50	189	.....	
12.14.10	186	.....	
12.14.30	188	.....	
12.15.10	184	.....	
12.15.40	189	.....	
12.16.10	180	.....	
12.16.50	.....	.....	Killed with chloroform.

TABLE VI.—*Experiment* 15.—Animal, dog; weight, 3½ kilos.

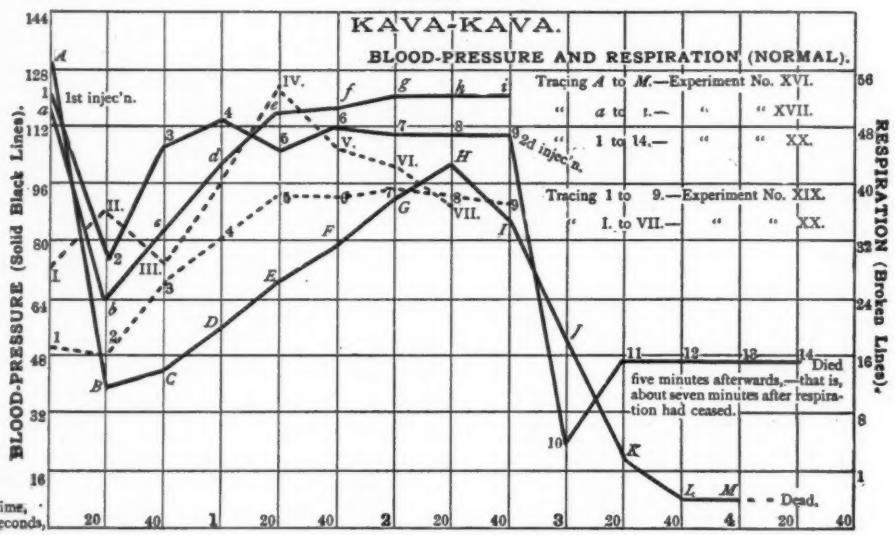
Time. h. m. s.	Pulse per min.	Dose.	Remarks.
4.06.15	230	.....	Cord cut in cervical region; vagi divided; artificial respiration.
4.06.25	.....	2 millilitres.	Injected into external jugular.
4.06.35	230	.....	
4.06.55	200	.....	Needle did not write accurately.
4.07.15	228	.....	
4.07.35	228	.....	
4.07.55	228	.....	
4.08.15	231	.....	
4.08.35	228	.....	
4.08.55	228	.....	
4.09.25	220	.....	
4.10.55	228	.....	
4.11.25	228	.....	
4.11.55	228	.....	
4.12.15	.....	.....	Killed with chloroform.

In one experiment, where the spinal cord alone was previously severed, the drug produced the same depressing effects on the pulse-rate. Under these circumstances, section of the vagi, with immediate application of artificial respiration, was instantly followed by an increased cardiac action. This significant result, and the fact that no appreciable changes are produced in the heart-beats, after previous division of all the nerves going to the heart, would seem to prove that kava-kava diminishes the number of pulsations by stimulating the cardio-inhibitory centres.

On Blood-Pressure.—Pari passu with the reduction of the pulse-rate there is, in the normal animal, a distinct fall of the arterial

Time. h. m. s.	Blood-pressure. mm.	Dose.	Remarks.
12.45	122–138	.....	Normal animal.
12.45.20	124–134	.....	
12.45.40	128–138	7 milli-litres.	Injected into external jugular.
12.46	36–44	.....	
12.46.20	42–48	.....	Breathing stopped.
12.46.40	52–60	.....	
12.47	66–72	.....	
12.47.20	74–82	.....	
12.47.40	88–96	.....	Eye reflexes destroyed.
12.48	96–106	.....	
12.48.20	80–90	.....	
12.48.40	48–60	.....	
12.49	10–30	.....	
12.49.20	8	.....	
12.49.40	8	.....	
12.50	...	.....	Animal died.

FIG. 2.


KAVA-KAVA.
BLOOD-PRESSURE AND RESPIRATION (NORMAL).
Tracing A to M.—Experiment No. XVI.
" a to l.— " " XVII.
" 1 to 14.— " " XX.
Tracing 1 to 9.—Experiment No. XIX.
" I. to VII.— " " XX.
1st injec'n.
2d injec'n.
Died five minutes afterwards,—that is, about seven minutes after respiration had ceased.
L M - - Dead.
BLOOD-PRESSURE (Solid Black Lines).
RESPIRATION (Broken Lines).
Time, in seconds.

pressure. Under small and moderate doses the pressure gradually rises again to its normal point, while under poisonous amounts the fall is followed by a rise (never to normal), or is steady until death takes place. In all these experiments a rise of the pressure above its normal height was at no period noticed. In only one, out of twelve experiments performed, where a small quantity of the medicine was employed (see Table IX., Experiment 18), a slight rise was observed at about three minutes, and again at about five minutes after the injection of the drug. The more usual effects, however, are seen in the following examples: (See Fig. 2.)

TABLE VII. — *Experiment* 16.—Animal, dog; weight, 5½ kilos.

TABLE VIII.—*Experiment* 17.—Animal, dog; weight, 10 kilos.

Time. h. m. s.	Blood-pressure. mm.	Dose.	Remarks.
3.30	110–130	.....	Normal animal.
3.30.20	110–130	.....	
3.30.25	.....	2 milli-litres.	Injected into external jugular.
3.30.45	60–70	.....	
3.31.05	80–86	.....	
3.31.25	100–104	.....	
3.31.45	110–120	.....	
3.32.05	106–124	.....	
3.32.25	110–124	.....	
3.32.45	110–130	.....	
3.33.05	110–130	.....	
3.34.05	110–130	.....	

TABLE IX.—*Experiment* 18.—Animal, dog; weight, 5 kilos.

Time. h. m. s.	Blood-pressure. mm.	Dose.	Remarks.
2.15	104	.....	Normal animal.
2.15.40	104	.....	
2.16	102	1 millilitre.	Injected into external jugular.
2.16.20	102	.....	
2.16.40	40	.....	
2.17	60	.....	
2.17.20	72	.....	
2.17.40	86	.....	
2.18	96	.....	
2.18.20	104	.....	
2.18.40	110	.....	
2.19	86	.....	
2.19.20	106	.....	
2.19.40	110	.....	
2.20	114	.....	
2.20.20	116	.....	
2.20.40	116	1 millilitre.	Another injection.
2.21	20	.....	
2.21.05	...	.....	Animal dead.

TABLE XI.—*Experiment* 20.—Animal, dog; weight, 20 kilos.

Time. h. m. s.	Dose.	Blood-pressure. mm.	Respiration per minute.	Remarks.
10	.....	110–118	84	Normal animal.
10.01	....	118–124	87	
10.01.10	12 millilitres.	.....	...	Injected into external jugular.
10.01.30	.....	62–70	108	
10.01.50	.....	100–110	81	
10.02.10	.....	114	120	
10.02.30	.....	120	159	
10.02.50	.....	112	135	
10.03.10	.....	110	126	
10.03.30	.....	110	114	
10.03.35	12 millilitres.	...	...	Another injection.
10.03.55	.....	24	...	Respiration stopped.
10.04.15	.....	46	...	
10.04.20	.....	...	...	Stopped drum half a minute.

FIG. 3.

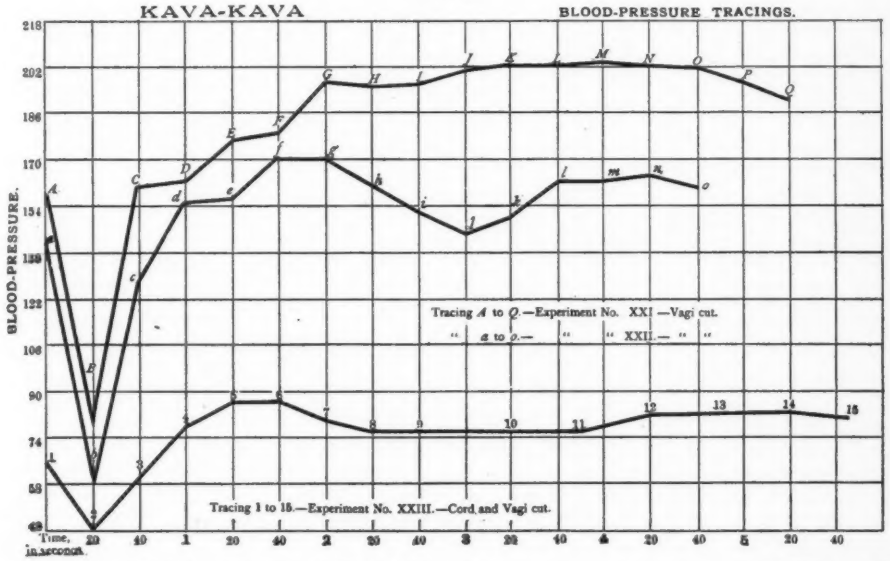

KAVA-KAVA
BLOOD-PRESSURE TRACINGS.
BLOOD-PRESSURE.
Time, in seconds.
Tracing A to Q.—Experiment No. XXI.—Vagi cut.
" a to p.— " " " XXII.— " "
Tracing 1 to 15.—Experiment No. XXIII.—Cord and Vagi cut.

TABLE X.—*Experiment* 19.—Animal, dog; weight, 3 kilos.

Time. h. m. s.	Dose.	Blood-pressure. mm.	Respiration in 20 secs.	Remarks.
10.10	.....	74–80	...	Normal animal.
10.10.20	.....	64–74	17	
10.10.40	1½ millilitres.	64–70	16	Injection into external jugular.
10.11	.....	24	26	
10.11.20	.....	24	25	
10.11.40	.....	20	38	
10.12	.....	46	38	
10.12.20	.....	68	39	
10.12.40	.....	74	38	
10.13	.....	66	35	
10.13.15	.....	...	...	Animal dead; respiration and heart stopped at the same time.
10.05	.....	90	...	Stopped drum half a minute.
10.05.45	.....	80	...	Stopped drum one minute.
10.09.45	.....	...	...	Heart stopped; dog dead.

This action of kava-kava is prevented by previous section of the pneumogastrics. Moreover, after this operation, small and large doses invariably produce a rise of pressure. These results appear to show that the fall occurring in the normal animal is due to an overpowering influence exercised on the cardio-inhibitory centres. The drug certainly increases the power of the cardiac viscus, but that is masked by a more decided action on the inhibitory centres. The

following experiments are appended: (See Fig. 3.)

TABLE XII.—*Experiment* 21.—Animal, dog; weight, 10 kilos.

Time. h. m. s.	Blood-pressure. mm.	Dose.	Remarks.
12.15	150–170	.....	Vagi cut; canula inserted in trachea; waited ten minutes after operation.
12.15.20	150–170	.....	
12.15.30	.....	6 milli-litres.	Injected into external jugular.
12.15.50	70–90	.....	
12.16.10	160	.....	
12.16.30	160–170	.....	
12.16.50	166–186	.....	
12.17.10	170–188	.....	
12.17.30	190–204	.....	
12.17.50	186–208	.....	
12.18.10	186–210	.....	
12.18.30	190–210	.....	
12.18.50	190–214	.....	
12.19.10	190–214	.....	
12.19.40	190–216	.....	
12.20.10	190–214	.....	
12.20.40	190–212	.....	
12.21.10	190–202	.....	
12.21.40	180–200	.....	
12.21.50	.....	.....	Killed with chloroform.

TABLE XIII.—*Experiment* 22.—Animal, dog; weight, 3½ kilos.

Time. h. m. s.	Blood-pressure. mm.	Dose.	Remarks.
4.05	106–130	.....	Vagi divided; canula in trachea; waited ten minutes after operation.
4.05.15	106–130	.....	
4.05.55	140–152	.....	Struggles.
4.06.15	136–150	.....	
4.06.25	.....	2 milli-litres.	Injected into external jugular.
4.06.35	60	.....	
4.06.55	130	.....	
4.07.15	150–158	.....	
4.07.35	152–160	.....	
4.07.55	170	.....	
4.08.15	170	.....	
4.08.35	152–168	.....	
4.08.55	152	.....	
4.09.25	144	.....	
4.09.55	150	.....	
4.10.25	162	.....	
4.10 55	162	.....	
4.11.25	164	.....	
4.11.55	160	.....	Eventually killed with chloroform.

Now, for the rise of blood-pressure, after previous section of the vagi, two important factors must be taken into consideration,—stimulation of the vaso-motor system, and a direct action on the heart either on its muscle or its contained ganglia. To determine this point the drug was administered after the production of the vaso-motor paralysis,—that is, after division of the spinal cord; and also after section of both vagi, artificial respiration being maintained at the same time. Even in these cases kava-kava was still able to elevate the arterial pressure. Several experiments were performed with the same results, but to illustrate these I will only detail the following example:

TABLE XIV.—*Experiment* 23.—Animal, dog; weight, ———.

Time. h. m. s.	Blood-pressure. mm.	Dose.	Remarks.
11.20	50–60	.....	Cord and vagi cut; artificial respiration.
11.21.15	60–70	.....	
11.21.25	.....	2 milli-litres.	Injected into jugular.
11.21.45	48	.....	
11.21.55	60	.....	
11.22.15	74–80	.....	
12.22.35	76–80	.....	
12.22.55	86	.....	
12.23.15	86	.....	
12.23.35	76–84	.....	
12.23.55	76	.....	
12.24.55	76	.....	
12.25.25	82	.....	
12.25.55	82	.....	
12.26.25	82	.....	
12.26 50	80	.....	Killed with chloroform eventually.

TABLE XV.—*Experiment* 24.—Animal, dog; weight, 20 kilos.

Time. h. m. s.	Pulse per minute.	Blood-pressure. mm.	Respiration per minute.	Dose.	Remarks.
11.30	...	.....	...	.....	Vagi cut; canula in trachea; connection made with respiratory tambour ten minutes before injection.
11.40	...	124–144	...	.....	
11.40.20	180	124–144	51	4 milli-litres.	Injected into external jugular.
11.40.40	183	80–90	51	.....	
11.41	183	120–140	48	.....	
11.41.20	174	144–160	48	.....	
11.41.40	180	152–170	39	.....	
11.42	183	170–180	36	.....	
11.42.15	184	170–186	36	.....	Stopped drum two minutes.
11.44.15	...	180–190	...	.....	
11.44.30	188	180–192	32	.....	Killed eventually with chloroform

In some of the normal experiments, after the usual effects of the drug were produced, asphyxia and stimulation of the crural or sciatic nerve, with weak and strong electrical currents, were followed by a decided rise of the arterial pressure, showing that the vaso-motor system was intact.

No apparent effect was noticed when the drug was applied directly to the cut-out heart of the frog, or to the viscus *in situ*, which would lead me to exclude an action on the cardiac muscle; but the increase of the pressure, accompanied by a diminution of the pulse-rate, even after section of the vagi, would show stimulation of the heart-muscle. This rise, then, is due to an action on the heart itself.

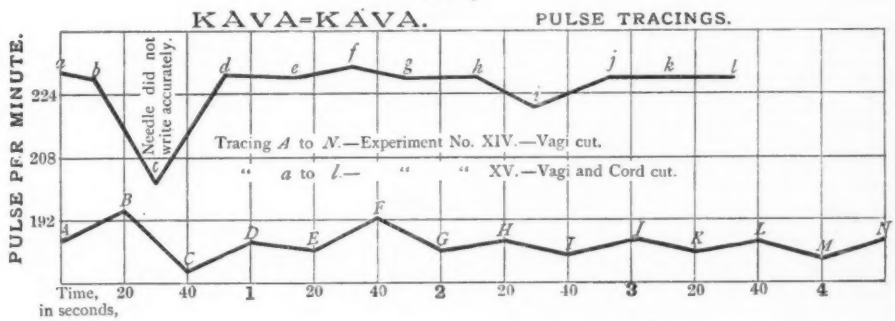
On the Respiration.—Kava-kava, in small, moderate, and comparatively large doses, is a powerful stimulant to the respiration. Poisonous quantities paralyze this function.

Time. h. m. P.M.	Rectal temperature.	Dose.	Remarks.
12.30	38.6° C.	.....	Animal quiet.
1.30	38.8° C.	.....	
2.30	38.6° C.	.....	
3.30	38.5° C.	.....	
5	38.7° C.	.....	

TABLE XVII.—*Experiment* 26.—Animal, small dog; weight, 2½ kilos.

Time. h. M.	Rectal temperature.	Dose.	Remarks.
12	39.2° C.	12 millilitres.	Injected hypodermically.
P.M. 1	38.6° C.	.....	Animal perfectly paralyzed.
2	38.5° C.	.....	
3	37.1° C.	.....	Extreme weakness of hind legs, but paralysis has apparently disappeared.
4	37.6° C.	.....	Dog recovered.

FIG. 4.



These effects are seen in Experiments 19 and 20. The primary stimulation is not observed after section of the vagi, as is shown in Experiment 24, an example of many others performed. The behavior of the drug here is evident. The primary stimulation is due to excitation of the pulmonary peripheries of the pneumogastrics, the depression and final abolition of the respiratory function to an influence exercised on the centres situated in the medulla oblongata.

On Temperature.—In small doses kava-kava increases slightly the temperature. Large amounts diminish it. The two following examples will serve as illustrations:

TABLE XVI.—*Experiment* 25.—Animal, small dog; weight, 2 kilos.

Time. h. m. A.M.	Rectal temperature.	Dose.	Remarks.
11.30	38.0° C.	1 millilitre.	Hypodermic injection.

From the foregoing study I am led to adopt the following conclusions:

1. Kava-kava produces general anæsthesia, and is especially a powerful local anæsthetic.

2. The drug diminishes, and finally destroys, the function of the afferent nerves, by affecting their peripheral ends.

3. Kava-kava diminishes, and eventually abolishes, reflex action, by influencing the spinal cord, and probably also the sensory nerves.

4. The paralysis produced by kava-kava is of a spinal origin, and is due to an action upon the cord.

5. Kava-kava, while increasing the force of the heart, diminishes the number of pulsations, by stimulating the cardio-inhibitory centres and ganglia, chiefly the former.

6. The drug lowers arterial pressure through an action upon the vagi. It afterwards elevates it, however especially after

previous division of the pneumogastrics, by a direct action on the heart.

7. Kava-kava at first stimulates, afterwards depresses, and finally paralyzes, the respiration. The primary stimulation is due to excitation of the pulmonary peripheries of the vagi; the latter effect to an influence exercised on the respiratory centres of the medulla oblongata.

8. Kava-kava, in small doses, increases slightly, and in large quantities diminishes, the bodily temperature.

9. The drug increases notably the salivary secretion.

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*THE RELATION OF ALBUMINURIA TO PUERPERAL ECLAMPSIA.**

BY WILLIAM S. GARDNER, M.D.†

IT has not been the object of the writer of this paper to speculate concerning the causes of either albuminuria or eclampsia, but to record a few observations that have some bearing upon the prognosis in cases of albuminuria during pregnancy, and also upon the possibility of the prediction of puerperal eclampsia. The observations include a report of the percentage of cases of albuminuria discovered in one hundred and eighty pregnant and parturient women, taken consecutively, and an abstract of the records of the cases of eclampsia occurring within the selected period.

The patients whose urine was examined were confined at the Maternité Hospital, Baltimore, between April 1, 1889, and August 1, 1890. The examinations of urine were made by Drs. Todd and Allen, resident physicians. The heat test and the nitric acid test, being undoubtedly the best tests for practical purposes, were used. The figures represent the volume of coagulated albumen which settled to the bottom of a test-tube, after a test-tube full of urine had been acidified with acetic acid, boiled, allowed to cool, and left to stand twenty-four hours, as compared with the quantity of urine boiled. Where a "trace" is recorded, it means a quantity that could have been readily detected by any one reasonably expert in urinary analysis.

The urine of each patient was examined soon after admission, and where albumen was once found, or where there were any indications that it was likely to be found, the urine was examined repeatedly up to the time of labor. Patients who were admitted to the hospital while in labor were necessarily exceptions to this rule. Urine from all patients was examined on the first and on the eighth day after labor.

QUANTITY OF ALBUMEN FOUND.

No.	Before labor.	First day after labor.	Eighth day after labor.	No. of child.
1.....	0	$\frac{1}{15}$	0	First.
2.....	0	$\frac{1}{20}$	0	Fourth.
3.....	$\frac{1}{10}$	$\frac{1}{8}$	0	First.
4.....	...	$\frac{1}{12}$	0	Second.
5.....	In labor $\frac{1}{4}$.	$\frac{1}{12}$	0	Third.
6.....	...	$\frac{1}{15}$	Trace.	Fifth.
7.....	0	0	$\frac{1}{10}$	Second.
8.....	Trace.	0	0	First.
9.....	...	0	Trace.	First.
10.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{8}$	Second.
11.....	0	$\frac{1}{15}$	0	Second.
12.....	0	$\frac{1}{8}$	0	First.
13.....	0	0	$\frac{1}{15}$	First.
14.....	...	0	Trace.	First.
15.....	0	0	$\frac{1}{8}$	Second.
16.....	0	0	Trace.	First.
17.....	...	0	Trace.	First.
18.....	Trace.	0	0	Second.
19.....	0	0	Trace.	First.
20.....	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	Third.
21.....	0	$\frac{1}{4}$	0	First.
22.....	0	Trace.	0	First.
23.....	Trace.	0	0	Second.
24.....	0	0	$\frac{1}{8}$	Third.
25.....	0	$\frac{1}{4}$ in labor.	...	First.
26.....	0	$\frac{1}{8}$	0	First.
27.....	$\frac{1}{15}$	$\frac{1}{4}$	...	First.
28.....	0	0	Trace.	First.
29.....	0	Trace.	0	Fourth.
30.....	0	Trace.	0	Second.
31.....	0	$\frac{1}{3}$	Trace.	First.
32.....	0	Trace.	Trace.	First.
33.....	0	Trace.	0	First.
34.....	0	0	Trace.	First.
35.....	0	Trace.	$\frac{1}{10}$	First.
36.....	$\frac{1}{12}$	Trace.	0	First.
	8	22	17	

Thirty-four of the one hundred and eighty cases were in labor when admitted, so that it was not possible to examine their urine before labor. In the urine of the one hundred and forty-six cases examined, albumen was found eight times, or in about five and a half per cent. The urine from all cases confined was examined within twenty-four hours after

* Read at the meeting of the American Association of Obstetricians and Gynæcologists, Philadelphia, September 16, 1890.

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labor, and albumen was found twenty-two times, or in twelve and two-ninths per cent. The urine from one hundred and seventy-seven patients was examined on the eighth day, and albumen found seventeen times, or in about nine and five-sixths per cent. Taking the whole one hundred and eighty cases, albumen was found one or more times in the urine of thirty-six, or in twenty per cent. Ninety-six of the patients were primiparæ; of these, albumen was found in the urine of twenty-two, or in twenty-three per cent. Eighty-four were multiparæ; of these, fourteen, or sixteen and two-thirds per cent, had albumen in their urine one or more times.

Included in the one hundred and eighty cases were four who had convulsions. This proportion is much greater than is ordinarily found, the rate, as is well known, being usually about one case of convulsions in five hundred pregnancies.

The following notes are abstracts of the records of the cases as kept by Dr. William J. Fodd and Dr. Samuel H. Allen, resident physicians at the Maternité:

Case 1487.—Aged 20 years; primipara; admitted to the hospital March 28, 1889. Her urine was examined repeatedly before labor, and was always found to have a very low specific gravity, but perfectly free from albumen.

She was delivered at 4.40 A.M., May 25, 1889. Between 3.55 P.M. and 9 P.M. of that day she had fourteen convulsions. From May 26 to May 30 inclusive she had numerous convulsions, and passed large quantities of urine involuntarily, which, upon examination, was found to contain no albumen. She died at 9.40 A.M. May 30.

The autopsy was held next morning by N. G. Keirle. A small area of the lower lobe of each lung was in the first stage of pneumonia. The kidneys were small, flat, and lobulated. The other organs were found normal. Dr. Keirle gave the opinion that the cause of death was chronic interstitial nephritis.

Case 1595.—Aged 23; primipara; was admitted to the hospital January 4, 1890. A specimen of her urine was examined January 11, with the following result: Specific gravity, 1020; acid reaction to litmus; no albumen. Since she had no œdema of the limbs, no headache, nor other symptoms pointing to a possible derangement of the kidneys, her urine was not again examined.

At 12.30 A.M., January 25, she had a convulsion, which was followed by twelve more before 2.15 A.M. Early in the forenoon labor came on spontaneously. There were no more convulsions until 7 P.M., when she had one, which was followed by the second at 9 P.M. A few minutes after nine she was delivered by short forceps of a dead child weighing six pounds. At 9.45 P.M. the convulsions again returned. She died at 12.55 A.M., January 27, forty-eight hours after the first convulsion.

After the first convulsions some urine was drawn from the bladder, and the examination gave the following result: Specific gravity, 1012; albumen, one-quarter per volume. The next day at noon the urine was again examined: Specific gravity, 1020; albumen, five-eighths per volume.

The kidneys were examined post mortem, and found to be very much congested, but the changes had not gone sufficiently far to say that they were inflamed.

Case 1624.—Aged 19; primipara; admitted to the hospital March 12, 1890. She gave a history of having had dropsy subsequent to scarlet fever when a child. Her urine was examined March 14: Specific gravity, 1020; acid reaction to litmus; no albumen.

One week afterwards she complained of headache and sleeplessness, and her extremities were œdematous. Analysis of her urine revealed a trace of albumen. Her bowels were kept moving with saline cathartics, and she drank potassium bitartrate lemonade during the daytime. Under this treatment her headache disappeared entirely, she slept well, and was bright and cheerful. Her urine was examined March 21, April 5, 8, 10, and 19. At each examination a small quantity, never more than one-sixteenth per volume, of albumen was found.

Labor began about 9 A.M., April 25. The labor progressed slowly, but there was nothing unusual until the next morning at 9.25, the labor being in the second stage, when she had a convulsion; chloroform was given, and she was promptly relieved. After the effect of the chloroform passed off, she was perfectly rational, and said she felt much better.

After the convulsion her urine was examined, and one-fourth per volume of albumen was found, or four times as much as the largest quantity present at any previous examination.

During the afternoon she had a number of convulsions. After eight o'clock that evening there was complete suppression of urine. She died at 2.05 A.M. April 27. No post-mortem examination was allowed.

CASE 1658.—Aged 38; primipara; was admitted to the hospital June 9, 1890. Her feet were slightly swollen. Examination of her urine showed: Specific gravity, 1010; acid reaction to litmus; no albumen.

She was given a saline cathartic and potassium bitartrate lemonade.

Her labor began about 1 P.M., June 13, and was completed at 2 A.M. of the 14th. After she was put into bed, she said she felt well except a slight headache. At 5.15 A.M. she had a convulsion, followed by the second at 5.45 A.M. At half-past six four ounces of dark-colored urine were drawn off and analyzed: Specific gravity, 1028; acid reaction to litmus; one-third per volume albumen. At 9 A.M. she had a third convulsion. She was kept under the influence of chloral, and the convulsions did not return. Her urine was examined subsequently, with the following results:

Date.	Specific gravity.	Reaction.	Albumen.
June 15.....	1026	Acid.	None.
June 16	1024	Acid.	None.
June 17.....	1026	Acid.	Trace.
June 18.....	1032	Acid.	None.
June 19.....	1030	Acid.	None.
June 20.....	1030	Acid.	None.
June 21.....	1028	Acid.	None.

The following case, although it occurred at the Maternité, is not included in the list of one hundred and eighty, because she was not confined until after that list was completed, but I report it because of its bearing on the subject:

CASE 1682.—Aged 18; primipara; was admitted to the hospital August 2, 1890. The result of the analysis of her urine before labor was: Specific gravity, 1028; acid reaction to litmus; a trace of albumen. Her labor began August 19 about 9 P.M. The labor progressed favorably until 11.40 P.M., when she became suddenly unconscious, and was immediately seized with a convulsion, lasting about one minute. This was quickly followed by two more convulsions, the patient being perfectly rational in the intervals. A catheter was at once passed, and some urine drawn. Analysis of this specimen showed: Specific gravity, 1010; acid reaction to litmus; and no albumen. She was delivered of a living child at 1.16 A.M. August 20. She had seven more convulsions within the sixteen hours immediately following delivery.

The following are the results of further examinations of her urine:

Date.	Specific gravity.	Reaction.	Albumen.
August 20.....	1012	Acid.	Trace.
August 21.....	1022	Acid.	None.
August 23.....	1024	Acid.	None.
August 25.....	1030	Acid.	None.
August 27.....	1024	Acid.	Trace.

Briefly reviewing these cases, we find that Case 1487 was under observation almost two months, and, though her urine was examined frequently, a low specific gravity was always found, but never a trace of albumen. There was no headache, no œdema, nothing but the low specific gravity to indicate that the patient was not in perfect health. Yet in less than twelve hours after labor she began to have convulsions, which were continued until she died. These convulsions were not of the type usually observed, but resembled more closely the convulsions of hysteria, her body and limbs being thrown into the most grotesque contortions. Her urine was repeatedly examined, both before and after the convulsions set in, but no albumen was found at any time.

Case 1595 was under observation three weeks before confinement. No albumen was found in her urine before the accession of the convulsions, and there were no symptoms that gave warning of impending danger. After the first convulsions her urine was examined, and found to be one-fourth per volume albumen. The next day, there having been a number of convulsions in the interval, her urine was again examined, and found to be five-eighths per volume albumen, or more than double the quantity of the previous day.

Case 1624 gave a history that pointed to the probability that she had suffered from parenchymatous nephritis subsequent to scarlet fever. Under these circumstances her urine was examined with great care. The first examination showed a perfectly normal urine: a number of other examinations before labor each revealed a small quantity of albumen. During the second stage of labor she had a convulsion. Her urine was examined, and found to be one-fourth per volume albumen. Later there was complete suppression of urine.

Case 1658 was under observation four days before labor. Analysis of her urine gave no trace of albumen. More than three hours after delivery she had a convulsion, which was followed in half an hour by a second. One hour and a quarter after the first convulsion, analysis of her urine showed one-third per volume of albumen. Her urine

was examined each day for one week after the convulsions, and a trace of albumen found only one time.

Unfortunately, the urine from Case 1682 was examined but one time before labor, when a trace of albumen was found. As soon as the convulsions appeared a catheter was passed, and some urine drawn off, which must have been secreted before the convulsion. It was examined, and found to contain no albumen. Several hours afterwards her urine was again examined, and the presence of a small quantity of albumen was ascertained. Within the following week her urine was examined four times, and a trace of albumen found but once.

To make the statement general, in a series of one hundred and eighty consecutive cases, five and a half per cent. were shown to have albumen in their urine before labor, and more than twelve per cent. of them the first day after labor. Included in this series were four patients who were attacked by convulsions. Of the four, in only one case was the presence of albumen detected before labor; in three cases there was a large quantity of albumen present soon after the convulsions; in one case there was never any albumen present; and in one there was no albumen present twenty-four hours after the convulsions.

Elliot reports, in his "Obstetric Clinic," ten cases of puerperal convulsions, the urine from each of which was examined before the convulsions came on. In these albumen was discovered four times, and its absence was ascertained six times. In three cases there was no albumen in the urine, either before or after the convulsions.

In connection with the above cases are reported seven other cases of marked albuminuria, four of which died, but none had any convulsions.

Or, to put it in another way, he records eleven well-marked cases of albuminuria, only four of which had convulsions; and, on the other hand, there were six cases of convulsions where the urine was analyzed, but no albumen and no other signs of kidney lesions were discovered before the appearance of the convulsions.

Adding these cases to the ones already related, we have fifteen cases of puerperal convulsions. The urine from each case was examined before the convulsions appeared. Albumen was found six times, and it was not found nine times.

The number of cases here presented is too small from which to draw any definite conclusions; but if we are allowed to consider these to be average cases, we are warranted in drawing the following conclusions:

1. The presence of albumen in the urine of a pregnant woman is no sufficient cause upon which to base a prognosis of probable eclampsia.

2. The failure to find albumen in the urine of a pregnant woman is no evidence of the absence, or, at least, of the continuance of the absence, of the condition that gives rise to puerperal convulsions.

3. Albumen is so frequently found in considerable quantities in the urine of patients immediately after the appearance of puerperal convulsions, that we are justified in making the statement that the convulsions are the probable cause of the albuminuria.

HYPODERMIC USE OF ARSENIC.

By Harold N. Moyer, M.D.*

AMID the therapeutic scepticism of this age a few remedies have retained their popularity that have come down to us from the fathers. Among the first of these we rank arsenic. Its range of application is perhaps more limited than it was, and the indications for its use are more closely defined, but it is still of high repute in the treatment of certain chronic skin-affections, diseases of the nervous system, and as an alterative and tonic. It is still considered of great value as an antiperiodic, though overshadowed by quinine, its more powerful and less dangerous rival.

In view of the known virtues of the drug, a certain and safe means of introducing considerable quantities into the system without disturbance of the digestive tract must certainly be regarded as a distinct advance in therapeutics.

The hypodermic use of Fowler's solution has been recommended by numerous writers. Among others, Hammond,† who claimed that the dose which could be administered in this way was much greater than could be safely administered by the mouth. He says, "I have frequently given as high as 35 drops of Fowler's solution as an initial dose. It is very certain

* Professor of Physiology, Rush Medical College; Fellow of the Chicago Academy of Medicine.

† "Nervous Diseases."

that the stomach would not tolerate this quantity. Again, I have often carried the amount given by the mouth to the utmost bounds of prudence,—till the eyes were puffed and vomiting was almost incessant,—and then have continued the arsenic in larger doses, by hypodermic injections, with the result of the cessation of all gastric symptoms and the cure of the disorder."

Hammond certainly recommends larger doses than any author we have seen, with the exception of Eulenberg, who is quoted by Rosebach and Nothnagel,* as having given .15 (2¼ grains) to .2 (3 grains) of pure arsenious acid without untoward effects. We cannot, however, but regard this as a misprint or an error in translating.

Dr. Frühwald † treated twenty-two cases of chorea minor by this method. He says that redness of the skin at the site of the punctures was common, and two or three abscesses formed. The dose was from 5 to 20 drops, and after the use of thymol and deeper injections no further trouble was observed.

Grunnach ‡ treated one hundred cases of goitre with hypodermic injections of Fowler's solution, 1 part to 4 of water.

Dumont § treated twenty-six cases of goitre with injections of 10 minims of Fowler's solution. He notes that inflammatory adhesions at the site of the punctures are frequent.

Hammond ‖ says that in the hypodermic use of Fowler's solution there is a decided tendency to the development of cellulitis and consequent abscess, as well as painful cutaneous inflammation. He recommends that a point should be chosen where the skin is loosely attached to the subjacent tissues. If the outer aspect of the arm near the insertion of the deltoid is selected, an abscess is the invariable sequence.

It will be seen that these writers speak of the irritating properties of Fowler's solution when injected beneath the skin. This has been attributed by some to a septic condition of the solution, and by others to the spirits of lavender used to color it. In a conversation with Dr. W. S. Haines, Professor of Chemistry in Rush Medical College, he suggested that, while septic matter might produce an abscess, and probably was frequently present if the solution was carelessly prepared, in the great majority of instances the irritating properties of Fowler's solution, when injected into cellular tissue, was due to the varying amounts of arsenious acid contained in the preparation. As ordinarily prepared and sold in the shops, all of the arsenious acid is not converted into arsenite of potassium, and so could not fail to be irritating. He further suggested the use of the arseniate of sodium, a stable salt, readily soluble, and of definite composition, and kindly prepared a one per cent. solution, and subsequently a five per cent. solution, that were used extensively in the clinic for nervous diseases.

Dr. Haines recommends that the pure anhydrous salt be used; as ordinarily found in the shops, it may contain from four to twelve molecules of water of crystallization. If this be driven off, by heating to 300°, the resulting salt has a definite composition. With the formula Na_2HAsO_4, a 1 to 100 solution of this salt contains 53 per centum of the arsenic found in Fowler's solution, so, approximately, the dose of such solution should be about twice that of the liquor potassii arseniatis.

The results with the use of this solution were excellent. In one hundred and twenty-seven injections, with a dose varying from 6 minims of a one per cent. solution to 15 minims of a five per cent., slight induration was produced six times; in one instance, with some induration, the skin was a little reddened and tender. In one case there was some ecchymosis, though this might have come from a little want of care in using the syringe. It may be stated that this induration was only slight; in no case did it call forth any complaint on the part of the patients, and in no instance was there anything approaching an abscess. That the slight irritation was not due to the salt was amply shown by the fact that the five per cent. solution caused no more irritation than the one per cent.; in fact, it was rather due to the quantity. When the syringe was filled (15 minims) with either strength some induration was caused, while a less quantity (5 to 10 minims) caused no change whatever.

The results of this treatment are shown by a few cases taken from records:

A. D., aged 14; female. Has had marked involuntary movements of all the extremities for the past four years. During that time she has never been wholly free from them, though there have been marked exacerbations each year. Puberty has been recently established. Diagnosis, chorea. She was im-

* "Materia Medica and Therapeutics."
† *Jahrbücher für Kinderheilkunde*, 1887.
‡ *Schmidt's Jahrbücher*, ccx. p. 195.
§ *Corr. Blt. für Sch. Aerzte.*
‖ Ibid., p. 745.

mediately placed upon arsenic hypodermically, beginning with 3 minims of the five per cent. solution, and increasing every second day, until three weeks after beginning the treatment, when she was receiving 13 minims of the solution at each injection, with an arsenic equivalent of about 36 minims of Fowler's solution. At the ninth injection she was discharged cured.

S. McC., aged 13; female; diagnosis, chorea. This was one of recent chorea due to fright, without rheumatic or heart complications.

July 5.—Treatment began by the administration of 7½ minims of Fowler's solution (by the mouth) thrice daily. On the 19th the patient reported that she was worse, and suffered from peculiar sighing respirations, that were very distressing. She was then given 10 minims of the one per cent. solution; on the 22d, 15 minims; and on the 24th, 30 minims. At this time the painful respiration had ceased, and the patient was greatly improved. The dose was increased rapidly until August 23,—about one month after commencing treatment,—when the patient was discharged cured. The last five injections in this case were equivalent to 30 minims of Fowler's solution.

H. H., a slight, anæmic girl; aged 15; presented herself in June with a history of chorea extending back into early spring. She was placed upon Fowler's solution by the mouth, but at the end of a month, there being no improvement, it was changed to hypodermic injections of the arseniate. She was discharged at the end of a month perfectly restored. 12 minims of the five per cent. solution was the highest dose recorded in this case.

G. H., chorea of five years' standing in a pale, anæmic girl of 13. The chorea had resisted all treatment, and the mother had had the child at various clinics, but without result. She was immediately placed upon 5 minims of the five per cent. solution, which was rapidly increased until in six weeks' time she had reached a dose of 15 minims, with an arsenic equivalent of about 42 minims of Fowler's solution. At the present time she is fully recovered, and has gained six pounds in weight.

In this connection we desire to especially emphasize the tonic action of this kind of medication, which, we think, is amply attested by the improvement in weight and color of all our cases. This we hope to demonstrate more conclusively in the not distant future by enumerating the blood-corpuscles and estimating the hæmoglobin.

The treatment has been employed thoroughly in two cases of paralysis agitans and in other forms of tremor, but without confirming the observations of Eulenberg as to its value in these conditions.

We cannot leave this part of our subject without calling attention to the case of a woman who presented herself at the clinic with enormous lymphadenoma of the side of the neck. After a few deep injections into the glandular mass, it began rapidly to diminish; when it had lessened one-half, the patient ceased attending, and further results could not be noted. This observation is thoroughly in accord with numerous writers, who have reported equally good results from the use of Fowler's solution in the various forms of glandular enlargement passing under the terms lymphoma, lymphadenoma, and Hodgkin's disease. We are satisfied that the local application of arsenic would have been greatly extended in these cases had it not been for the irritating properties of Fowler's solution and the almost certain abscess which it causes in this kind of tissue.

The value of hypodermic injections of Fowler's solution in malignant tumors of the skin has been affirmed by Monckton,* Pick,† and Lesser.‡ Can we not look for an increased range of application in these cases, with a salt free from irritant properties, and consequent inflammation and abscess?

Before closing this article we desire to say an additional word regarding the solutions employed. When first made they were invariably aseptic, perfectly limpid, and would remain so indefinitely if tightly corked. After they were frequently opened, a slight opalescence would develop, due probably to some micro-organism. The solutions, however, remained free from pathogenic germs, as when injected not the slightest irritation was produced. We desire here to refer to the kindness of Messrs. Parke, Davis & Co., who have prepared for us hypodermic tablets, one containing one-tenth and the other one-twentieth grain of the salt. These have proved very convenient in private practice, though it will be apparent by a reference to our cases that the quantity in each tablet is much too small.

The action of arsenic given under the skin, if it have any virtue, must certainly be greater

* *British Medical Journal.*
† *Medical Record.*
‡ *Centralbl. f. die Med. Wissensch.*

than when taken by the stomach. Thrown into the cellular tissue, in the form of a feebly alkaline and readily soluble salt, it is at once absorbed by the blood and carried to all the tissues. Administered in this way, it at once reaches the skin and nervous tissues without running the gauntlet of the liver. As might be inferred, its action in these cases would resemble that of the salts of mercury when given by inunction or hypodermically. The liver seems to have a strong selective action for certain metallic salts, and among these arsenic must be accorded the first rank. As its toxic effects are largely focused upon the liver and adjacent abdominal organs, is it not rational, then, to suppose that, if given by the mouth, it would pass the liver with difficulty, and cause greater disturbance than if it were immediately distributed to all parts of the body by the general circulation?

THE PLACE OF MERCURY IN THERAPEUTICS.

By E. P. Hurd, M.D., Newburyport, Mass.

I.

WHEN mercury was a new remedy,—somewhat more than three hundred and fifty years ago,—one of its first applications was to the treatment of syphilis, then a new disease, at least in Europe. Mercurial preparations had been long in use by the Moors for the cure of external parasitic diseases (itch, mange, favus, etc.), and naturally the "Neapolitan ointment" came to be used in the cutaneous affections of syphilis,—a disease which became very prevalent early in the sixteenth century. Matthiolus, finding "red precipitate" efficacious in the rashes and other outward manifestations of venereal diseases, empirically prescribed it internally in 1536, and the following year the pills of Barbarossa, whose principal ingredient was mercury, derived celebrity from having cured Francis I. of syphilis. Paracelsus and his followers did much to bring mercury into vogue as an antivenereal remedy. In 1667 corrosive sublimate was first used internally,* but at a much earlier date mercurial inunctions were in general use.

The preparation of *calomel* was long a secret, but the method of procuring it was made known in 1608. "Its name, which signifies *beautiful black*, was applied to it by Sir Theodore Mayerne in compliment to a negro who assisted him in preparing it" (Stillé).

Like all new remedies, mercury had its season of popularity and decadence, and the extravagant expectations which were first entertained of it were not realized. It was given so lavishly, and so utterly without care or judgment,—from ignorance of its constitutional effects, no experimentation on animals or careful clinical experimentation having been performed,—that in numberless instances the toxic effects manifested themselves in salivation, paralysis, tremors, a most deplorable cachexia, and sometimes in ulcerations and in diseases of the bones, which, in intensity and extent, matched or surpassed anything produced by the syphilitic poison. As a result, the reaction against the new treatment became strong, and physicians were divided into two powerful parties,—the mercurialists and anti-mercurialists. Both parties appealed to facts that were incontrovertible,—the one to the multitudinous instances of recovery from syphilis under the use of mercury, sometimes *cito, tuto, et jucunde;* the other to the essentially *poisonous* nature of mercurial preparations, to the risks attending their use, and the certainly deplorable results that follow their abuse.

The present century has witnessed, perhaps, the most vehement opposition which has ever been made to the mercurial treatment of syphilis. It was begun in France by Broussais, who denied the specificity of syphilis, and has been continued by Broussais's followers in France, by Murphy in England, by Joseph Hermann in Germany, by Lorinsir, Klitzinsky, Melsens, Anzias, Turenne, Sperino, Boeck, Wm. Ferguson, John Thompson, Boerensprung, Diday, Desprès, and others. The natural evolution of the disease has been studied, and it has been shown that a certain proportion of syphilitic cases get well without mercurial treatment, or even any kind of treatment.

And yet we believe that we are but voicing the opinion of the great majority of physicians in all countries, when we affirm the superiority of mercury to all other medicines in the treatment of syphilis. Army surgeons and hospital surgeons have again and again made the trial—treating syphilitic patients now with, now without mercury, and generally the verdict has been in favor of mercurial treatment, at least in the manifestations of

* Stillé, "Therapeutics and Materia Medica," article "Mercury."

secondary syphilis.* Of course, mercurialization, carried to the extent of full salivation and the production of the physiological (toxic) effects of the drug, is not now advocated by any good authorities on venereal disease.† The good effects of mercurial treatment in causing disappearance of the cutaneous manifestations of syphilis are especially noteworthy.

When we come to investigate the actions of mercury on the human organism in health and disease, we are met by discrepancy and contradiction. Given to the non syphilitic person, mercury is said to diminish the plasticity of the blood and the number of globules. On the other hand, when administered to the syphilitic, mercury "plays the *rôle* of a tonic; it multiplies the globules, increases their vitality, regenerates them, increases the plastic qualities of the blood, provided that the dosage of the mercurial and the duration of its administration do not exceed certain limits."‡

This augmentation of the corpuscular richness of the blood of syphilitic patients under the influence of mercury has been noted by many competent observers. Thus, Wilbouchewitz, of Moscow, has studied the action of mercurial preparations on the blood by means of the hæmatimetric numeration of globules. He has always noticed that the number of red globules is greater in syphilitic persons during mercurial treatment than before. In animals under experimentation, the administration of mercury always occasions a diminution in the number of globules. Keyes, in this country, Robin, Schlesinger, and Martineau in Europe, have repeated these experimental investigations with similar results. Martineau has known the number of globules to go up under mercurial treatment from two to four and five millions, subcutaneous injections of mercuric ammoniacal peptones being used §

How are we to explain this difference of action? Why does mercury, the most powerful producer of spanæmia known, cure syphilitic anæmia? We are still able to give no better answer to this question than that given by Wilbouchewitz,—viz., that syphilis produces corpuscular disintegration and diminution; and mercury, by antagonizing this action, causes the globules to increase. In other words, syphilis being a microbe-disease, mercury destroys the specific microbe. It is still a choice between two evils, for mercury none the less acts as a corpuscular poison when given in syphilis; only the syphilitic agent more rapidly and more intensely spoils the blood and prostrates the vital energies, and mercury does a greater good than evil by staying the ravages of the baneful microbe.‖

Doubtless one cause of the evil effects of mercury, when given as an antisyphilitic remedy in the past, is that it has been prescribed for cases where it was not indicated, —*i.e.*, for cases of soft chancre or for subjects not really syphilitic, and for cachectic subjects in the tertiary period. Liebermeister

* "At the commencement of my military medical life I was deeply imbued with the views of Guthrie, who was a violent anti-mercurialist, and I treated for two or three years all my cases of syphilis without an atom of this medicine. But I was not satisfied with the results. The manifestations of syphilis were more severe, and lasted longer than was to have been expected; and I, therefore, did what I trust you all will do when you discover that you have been holding erroneous views and doing wrong acts,—changed my practice, and I have never regretted it to this day" (Dr. W. A. Hammond, "Lectures on Venereal Diseases," Philadelphia, 1864).

† Trousseau was almost the last advocate of the Boerhaave *drenching* method of administering mercury in syphilis" (see his "Treatise on Therapeutics," Am. ed., vol. i. p. 116).

‡ Jules Simon, "Conférences sur les Maladies des Enfants," tome i. p. 204.

§ Dujardin-Beaumetz, "Dictionnaire de Thérapeutique," article "Mercure."

‖ The question of the form in which mercurials exist after their introduction into the body is not yet settled,—*i.e.*, whether mercury acts chiefly as such, or whether the various compounds of mercury act by virtue of their individuality. Doubtless, as Bronson says, the pharmacodynamic form of mercury is one of the metal in intimate union with albumen. The antidotal theory—ably expounded by Beale—is as old as John Hunter. Another theory, well stated by Bronson, is this: The chief characteristic of syphilis is a tendency to hyperplastic cell-growth. The effect of mercury is to check this hyperplasia. It does this by imparting to the cells some quality which restrains their morbid activity, and predisposes them to retrograde metamorphosis. It does not act by restraining waste, by denutrition, but by retarded growth; nor does it aid repair. (*Med. Record*, vol. xx. p. 510.

This writer treats the doctrine that mercury acts in syphilis as *a general reconstituent tonic*, with a guarded scepticism. The facts, however, as observed by Keyes, Wilbouchewitz, and others are none the less incontestible. The action of mercury upon the syphilitic virus cannot be a simple chemical neutralization, for were that the case, the largest possible quantity of the drug that could be absorbed in the shortest possible time would act the most certainly, whereas we find that the opposite is the case, and that when from large doses of mercury salivation occurs, new localizations of the disease take place (Bäumler).

adds another contraindication : the mercurial should not be given too early in the evolution of the secondary accidents.* According to this authority, mercury should be given late rather than early ; never from the time of the first appearance of the induration. Doubtless, he says, the induration disappears more rapidly under the influence of the mercury, and the secondary manifestations are retarded ; on the other hand, when the latter do appear, "they are more intense and more rebellious to the specific treatment than when the primary sore was only subjected to local treatment."

It is hardly necessary to say that medical authorities are not at all unanimous as to the time when to begin the specific treatment. The Vienna school (Hebra, Zeissl, Sigmund), with Liebermeister, would wait for the full development of the secondary accidents ; while the Paris school, lead by Fournier, and eminent German authorities (Kaposi, Neisser, Leube, Edlefsen, Bäumler, Weber), affirm the superiority of early treatment, which should be begun as soon as the infecting chancre is diagnosticated.

We are of opinion that in this country and in England as many good authorities could be mustered on one side as on the other of this question, so that we shall not attempt to decide it ; in fact, only the most careful clinical experimentation—separate series of cases being treated according to the teachings of the two parties—can warrant a decision as to whether the mercurial treatment of secondary syphilis should be begun early or deferred to a comparatively late period. Only, it is proper to advise that the practitioner should never treat a suspicious induration as a specific, infecting lesion, *till he is sure that it is such.*

Mistakes in diagnosis are easy, and it is a serious matter to put a patient under mercurial treatment who has not syphilis and is really in no danger of having this disease. This mistake has been made again and again, and is the opprobrium of a practitioner. Again, it may be that in some cases of infecting chancre, the virus early undergoes development in the system, and therefore early mercurialization is demanded ; in other cases, the incubation period is prolonged, and mercury, if given before it meets the poison in the blood, may do more harm than good.

* "Lessons on Infectious Diseases," article "Syphilis." Tübingen, 1885.

It seems certain, from all the data we possess, that mercury, to have a "tonic and reconstituent effect" in syphilis, must be given when syphilis exists ; and it is safe to advise the young practitioner, who sees comparatively few cases of syphilis, never to attempt to treat this disease *till he is sure that the case before him is one of syphilis.*

It is not pretended that mercury can be given in syphilis to the extent demanded, *with absolute impunity ;* all that can be said is that it is better to give it than not to give it. But what anti-venereal medication can be said to be absolutely harmless ?

As for the preparations and doses, we shall not attempt to decide the question whether full doses, given daily within a brief period, so as rapidly—within a month or two—to bring the system under the influence of the drug, the mercurial to be then stopped ; or whether small doses, whose administration is prolonged weeks, months, and years, constitute the safest and most effectual method. We content ourselves with stating the methods. Sometimes, doubtless, the rapid method is safest ; sometimes, on the contrary, it would be highly detrimental.

At the Tübingen clinic, the mercurial employed is calomel, in large doses. Liebermeister begins by giving 10 centigrammes (1⅔ grains) of calomel night and morning. The dose is gradually raised to 50 centigrammes (8⅓ grains) night and morning, and this remains the maximum dose to the end of the treatment. The mouth is frequently rinsed with chlorate of potash solution to prevent salivation, which is not considered a desideratum. There is seldom diarrhœa to give trouble. The mercurial treatment is continued about forty days. The Tübingen formula is as follows : For five days, morning and evening, 10 centigrammes. The five following days, 20 centigrammes. The next five days, 40 centigrammes ; the next five, 50 centigrammes ; this maximum dosage is kept up twenty days longer. In patients the subjects of anæmia and debility the doses are smaller and the duration of the treatment much longer.

Liebermeister affirms that his experience has shown that an energetic medication of this kind, applied during a brief period, does much less harm than a treatment less active, but continued much longer. He admits, however, that this method is better adapted to hospitals, where the patient is continually under observation.

Dujardin-Beaumetz prefers the method by

mouth to inunctions, the mercurial fumigations or baths, or to hypodermic injections of mercuric ammoniacal peptones. The bichloride or biniodide are the salts of his choice.

Van Swieten's solution of bichloride, which is a 1 to 1000 solution, may be given in teaspoonful doses three times a day, or from two to three a day of the protiodide pills (½ grain) may be given, or the same number of Gibert's pills of the biniodide. Physicians in this country who believe much in a mixed treatment are prone to adopt a medication which is more or less a modification of that recommended by Hammond in his "Lectures on Venereal Diseases." A solution of corrosive sublimate with potassium iodide is given till the system is well under its influence. A convenient formula is as follows:

℞ Potass. iodidi, ʒi;
Hyd. bichlorid., gr. vi;
Aquæ, ℥xii.
Dose.—A teaspoonful three times a day.

As a rule, the patient is kept under the mild influence of this medicine for at least five months. Instead of this preparation, a grain and a half of the protiodide, in divided doses, may be given daily during the same length of time. Under this treatment the gums are seldom touched, and mercurial cachexia is for the most part avoided.

In his standard treatise on venereal diseases,* Keyes advises what he calls the tonic treatment of syphilis by mercury. He would never begin treatment till the first general symptoms of syphilis appear; would use the same drug continuously in varying doses. He prefers the protiodide, using Garnier's (French) granules, each of which contains 1 centigramme (⅙ grain). To bring a patient under the tonic treatment the following course is advised: Let him take 1 granule of the protiodide after each meal for two or three days. On the fourth day, one extra standard dose is added at the mid-day meal; now four granules are taken daily, and this is continued for three days. On the succeeding fourth day, another standard dose is added, the five daily standard doses being taken, two in the morning, one at noon, and two at night. On the next following fourth day, always counting from the last fourth day, another dose is added, two standard doses being now taken after each meal,—six granules a day. The doses in some cases are increased to nine and even twelve granules a day, when griping and diarrhœa set in, occasionally also the gums become touched; the limit is now reached. When the patient is taking twelve granules a day, he is taking his "full dose," which is only to be used in cases of necessity; ordinarily one-half of the full dose is the "tonic dose," and may be continued steadily for several years without injury to the patient. Of late, Keyes contents himself in most cases with "one-third," instead of "one-half," the "full dose." This dose is also "tonic," and is continued daily, year in and year out, for, in round numbers, about three years.

This mode of treatment is, in the main, endorsed by Greenough in the *Boston Medical and Surgical Journal*, August 17, 1882. Most patients, he says, will do very well on ⅓ grain doses of the protiodide *ter die;* the bichloride, ⅙-grain *ter die*, is sometimes borne where the protiodide is not.

Bäumler says that the rule should be to select the mercurial preparation which can be continued for the greatest length of time without causing derangement of the digestive organs. In accordance with this rule, he would give the preference to blue pill, or *hydrargyrum cum creta*, over calomel ("Ziemssen's Cyclop.," vol. iii. p. 290).

To speak from my own experience, I would say that country physicians, as a rule, prefer the "mixed treatment," believing that the combination of mercury with iodide of potassium is admirably adapted to secondary syphilis, and that *much less mercury* is needed when the mercurial is given along with iodide of potassium.

Greenough thinks that mercury is the mainstay in all stages of syphilis. The general consent of authorities, the world over, would, however, limit its usefulness to the secondary manifestations; in tertiary syphilis the principal reliance must be placed on iodide of potassium.

To conclude this part of our subject, it cannot be too strongly urged that mercury acts as a tonic and reconstituent in syphilis only by antagonizing the syphilitic virus and checking a greater evil, and that the smaller the doses that produce this result, the better (as a rule) for the patient.†

In another article we shall consider other uses of mercury in therapeutics.

* Keyes, "Venereal Diseases," 1880.

† See some excellent remarks by Dr. E. B. Bronson, "On the Action of Mercury in Syphilis" (*Medical Record*, vol. xx. p. 510).

HOW TO PREVENT HAY-FEVER.

By Alexander Rixa, M.D., New York.

In the May (1890) number of the Therapeutic Gazette I furnished some contribution to the "Treatment of Hay-Fever." I reported therein a favorable result in the treatment of this mysterious disease in the experience of my last year's cases.

My experience of this year is far more gratifying, and worthy of receiving a wide publicity.

I treated six cases in all, four of which have been habitual for years to hay fever proper without complications, while the other two used to have the disease aggravated with reflex asthma and bronchial catarrh.

I succeeded in preventing the outbreak of the disease in every individual case. The treatment I applied was very simple, and consisted of the following:

From the fact that I had known all my patients from previous years, I ordered them to my office two weeks before the usual onset of the disease. I advised them to irrigate the nose with a warm solution of chloride of sodium four times a day,—morning, noon, evening, and on retiring; and, a few minutes after the cleansing of the parts, had the nares thoroughly sprayed with peroxide of hydrogen and c. p. glycerin, half and half. Those subject to a conjunctivitis I prescribed a two per cent. solution of boric acid as a wash. At this period no internal medication was given, but three days previous to the usual onset of the disease I prescribed phenacetin and salol, five grains of each three times a day.

On the respective expected days, to the great surprise of all the members concerned successively, who have been in the habit of getting the disease almost invariably at a certain date, no hay-fever symptoms appeared, though every one had been the victim of the disease for a great number of years, varying from five to nineteen years' standing.

It is self-understood that this treatment was kept up all through the season, and, as no symptoms developed, the applications were reduced, towards the termination, to twice and once a day. The internal medication, however, was stopped after the expiration of the first week, and all the patients could attend to their various respective vocations, something they never have been able to do in previous years.

In two cases, though no nasal symptoms developed, about two weeks after the calculated onset, slight symptoms of asthma made their appearance. However, I could easily suppress them at this time with the aid of the hand atomizer and ozonizer, a very ingenious little apparatus, of which I gave a thorough description in my last year's article. I used the ozone inhalations every four hours, in connection with the internal administration of the following prescription:

℞ Iodide of ammonia, 8;
Fl. ex. quebracho, 30;
Fl. ex. grindelia robusta, 15;
Tr. lobelia, 12;
Tr. belladonna, 8;
Syr. pruni. virg., q.s., ad 120.

Sig.—Teaspoonful three or more times during twenty-four hours.

However, towards the end of the fourth week, especially in one case,—a stout, heavy-set gentleman,—very grave asthmatic symptoms developed, which compelled me to apply Chapman's spinal ice-bag, as well as resort to the internal administration of large doses of codeine during the paroxysm, with the most beneficial result.

I gave also oxygen inhalations a fair trial in the two cases. I find them to act very soothingly in the simple asthma, facilitating respiration after a few minutes; but during the paroxysmal stage they cannot be utilized, for the reason that respiration is short and rapid, and does not permit of a control in the quantity of the gas to be inhaled. Consequently, it is either of little use as a remedy; or, if too much is taken, a disagreeable headache will be the consequence.

During the catarrhal stage, which, however, was very mild compared with last year, I derived great benefit from the administration of codeine, in combination with terpine hydrate, in the pill form. The codeine has the advantage over all other opium preparations that it does not affect the digestive organs, and still acts in a soothing manner. While during last year's sickness my patients lost from ten to twenty pounds of their bodily weight, this year but one lost eight pounds and the other five pounds.

As the etiology of this troublesome disease is yet enveloped in obscurity, we may fairly conclude, by the success of my treatment, if it should meet with the confirmation of the profession, that the much pretended sensitive area, situated, according to Dr. Sajous, "at the posterior end of the inferior turbinated bones and the corresponding portion of the septum;" or, according to Dr. John Macken-

zie, who locates this area "at the anterior extremity of the inferior turbinated bone," need not necessarily be removed, or destroyed by cautery, in order to accomplish a cure of hay-fever proper.

I examined my patients twice a week, and the closest rhinoscopical exploration would not reveal the slightest pathological change in the mucous membrane of the nares.

Now, what is the etiological factor of the disease? Is it a specific germ conveyed by the air to the parts and—*locus minoris resistencia*—deposited at the pretended area, or is the germinal matter present in the nasal mucous membrane with certain persons, and requires only at a certain time and under certain conditions physiological stimulation to manifest periodical pathological changes, which give rise to the train of symptoms called hay-fever? Dropping all hypothetical reasoning, I think some outside vegetable germ is causing the disease in those predisposed, and peroxide of hydrogen acts on them as it does on the pus corpuscles,—*i.e.*, drives them out when and wherever it finds them. I hope the profession will give this new measure a thorough trial and report their results.

1264 Lexington Avenue.

ARSENITE OF COPPER.

By W. H. Bentley, M.D., LL.D., Woodstock, Ky.

HAVING read with interest the paper in the Therapeutic Gazette, by Dr. John Aulde, on the "Uses of Arsenite of Copper," in the June number of the present year (1890), I obtained from Messrs. Parke, Davis & Co. a sample of their tablets of arsenite of copper.

As the cases referred to by Dr. Aulde, treated by the arsenite of copper, appeared to have been acute, or, at least, recent cases of diarrhœa, and as my numerous cases of this affection recently treated had yielded very readily, and those under treatment appeared to be yielding rapidly to my usual treatment, I reserved the specimen tablets for a *possibly* more obstinate case, as I considered it hazardous and unwise to abandon a course of treatment that had proven safe and efficient in my hands for quite a number of years, simply to experiment with a new and by me an untried drug. In due time the following case presented:

Case I.—Little Emma J., aged 16 months, from May 1 had been occasionally suffering from acute diarrhœa, accompanied by high fever. These attacks readily yielded to my treatment, and entirely subsided on the appearance of the irritating teeth. July 20, when the superior canines, commonly called "the eye-teeth," were about to appear, she had by far the most serious attack, being thrown into spasmodic paroxysms. By the use of the gum-lancet the teeth were brought through, and under other treatment she was speedily relieved. Her fever and vomiting were at once allayed, but the diarrhœa continued to be quite troublesome. She had frequent motions through the day and more frequent ones through the night; in fact, rest and sleep at night were nearly impossible. The discharges, as shown by test-paper, were neutral; there was no febrile action perceptible; tongue, pulse, and temperature normal. The dejections were thin, but not watery; in color, rather light. The diarrhœa, in short, seemed to depend upon a passive condition of the system. After three days spent in fruitless attempts to control this state of things, I resorted to the *arsenite of copper*. I dissolved one tablet, one-hundredth grain, in sixteen teaspoonfuls of water, and ordered a teaspoonful every fifteen minutes. At the end of the four hours the patient was perceptibly better. Then a tablet was dissolved in ten teaspoonfuls of water, and a teaspoonful given every hour. By this time the bowels were controlled. Another tablet was dissolved in ten teaspoonfuls of water, and a teaspoonful given every two hours. Of this last the patient took but half, as she was then lively and well.

Case II.—My second case was that of a widowed lady, 69 years old, tall, spare, black eyes, and, even at so advanced age, raven-black hair. I had known the old lady for twenty-five years. During the five years that she resided near me I had treated her once for remittent fever. With that exception she had, for one of her age, enjoyed reasonable health, until January, 1890. Then she caught a cold, coughed considerably, and was generally indisposed, but not confined to bed. She had a "scape-justice" of a neighbor, who was peddling a nostrum labelled "Native Herbs." This consisted of some kind of contused leaves. One package was to be infused in a quart of boiling water, and when cold, taken in 2-ounce doses every four hours. In Mrs. M.'s case it proved a violent emetic and cathartic. Nor was this all. The irritation

of the stomach and bowels was so great that both the emesis and diarrhœa became chronic, and so remained to the date of my first visit. August 25 I was informed by the nurse that within the last twenty-four hours the patient had vomited fifteen times and there had been twenty-four dejections. During the last three or four weeks prior to my visit she had been made the treatment of a young, ignorant quack, with a bought diploma, which he could not read. On a small table stood a pint flask half-full of a dark, nauseous fluid, of which the dose was a tablespoonful, repeated every four hours. From its taste I could not recognize anything with which I was acquainted. It was evidently a decoction of some weed, perhaps a plant that had never been used by any other mortal. Besides, there was a large bottle of whiskey. Of this she got a tablespoonful every time immediately after vomiting. And this I was told had been his course of treatment throughout. At this time the patient was greatly emaciated and so extremely weak that she could not, without assistance, rise from her pillow or turn in bed. Her protracted vomiting had for a long while nearly deprived her of the benefit of food. The incessant diarrhœa, too, contributed in no small degree to her enfeebled condition. On examination I found the temperature normal; the radial pulse so feeble as to be scarcely perceptible, beating at 80; tongue clean and pale, much elongated and pointed, the edges of a dusky red; lips pale; some œdema of the feet and ankles. I dissolved one tablet of the arsenite of copper in five teaspoonfuls of water, and ordered a teaspoonful every thirty minutes. One hour and fifteen minutes after first dose she vomited and passed a small watery stool. Two hours later passed another small watery stool. At the end of five hours I prepared another tablet with five teaspoonfuls of water, directing a teaspoonful every hour. I then returned to bed. She had no vomiting and no movement of the bowels during the ensuing seven hours from the last mentioned. She then ate some squirrel soup and drank a little coffee, but without relish. Immediately after the meal she had 5 grains of lactated pepsin, the same in like doses to follow each ensuing meal. Another tablet was used in five teaspoonfuls of water, and an hour after the pepsin a teaspoonful was administered, with orders to give it every two hours. I left some tablets, with orders to dissolve each, when required, in five teaspoonfuls of water, and give the doses three hours apart. I then left for home, returning three days after. The nurse reported but one vomiting, and that soon after my departure, and four stools on that day, and three on each subsequent day, and these growing gradually more natural. At my second visit I found my patient improved in every respect. Temperature normal; tongue nearly so; some appetite. I continued the treatment, except the arsenite was given every four hours, and I ordered one 3 grain Bland's pill before each meal. Three days later I visited the case. Patient sitting on a chair by a small wood-fire. No vomiting or diarrhœa during my absence. Appetite keen and digestion good. Still some œdema remained in the feet. Left off the arsenite, and continued the pepsin and pills for a week longer. Patient's son reported œdema entirely gone and his mother well, except weakness.

From the above cases, and especially the last, it seems that arsenite of copper offers a hope even in inveterate cases of chronic diarrhœa. I admit that these two cases do not warrant a reliance on arsenite of copper in chronic diarrhœa. Still, I think, they are of sufficient significance to warrant their publication at some length of detail.

THE PHYSIOLOGICAL ACTION OF CARBOTHIALDINE.

Carbothialdine was first obtained in 1840 in the form of crystalline scales, somewhat resembling those of uric acid. It is insoluble in hot water and cold ether, slightly soluble in alcohol at the ordinary temperature, and decomposes in boiling water. DR. MAZZETTI has undertaken a series of experiments with carbothialdine, and his results are published in *Les Nouveaux Remèdes* for November 8, 1890. As it is insoluble in water, the author employed an emulsion in gum-arabic, which he injected into the subcutaneous tissue of the rabbit or the dorsal lymphatic cells of the frog, the dose being $\frac{1}{12}$ of $\frac{1}{6}$ grain. Some time after the injection the frogs showed evidence of increased excitability of the spinal cord, manifested by an exaggeration of reflexes, gradually progressing towards complete tetanus, death occurring from arrest of the heart in diastole. The excised heart was also arrested in diastole when supplied with serum containing carbothialdine. Muscular excitability, both direct and indirect, persisted some time after death. It seems, however, that this substance had no effect whatever on rabbits.

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Leading Articles.

COUNTER-IRRITANTS.

DOUBTLESS the therapeutic method known as counter-irritation is less employed to-day than formerly. If we except the occasional application of a sinapism or other mild rubefacient, many physicians seldom or never resort either to derivation or revulsion, at least in the treatment of ordinary acute diseases, and some have abjured this mode of treatment altogether. If we refer, for instance, to the treatment of pulmonary and cerebral inflammations, every physician who has been fifty years in practice recognizes the fact that, coincident with marked changes in fashion respecting the employment of bleeding and mercurials, much less importance is placed on the *fly-blister* to-day than was the case a few decades ago. It was formerly the current practice in pneumonia, about the end of the first week, "to push the mercurial treatment until the gums became somewhat affected" (Dr. Geo. B. Wood's "Practice," 1858), at the same time "to apply a large blister (8 by 10) to the chest." Dr. Wood, long a standard authority, directs (in accordance with popular usage) that this blister should not be put on before the fifth day, "as without unseating the inflammation (?) it might injuriously aggravate the fever." In acute cerebral inflammations the patient was to be at the proper time mercurialized, then over the shaved head tartar emetic ointment was to be rubbed, or a fly-blister applied. The physician of fifty years' experience, to whom we have alluded, would freely admit that if in the practice of himself and his contemporaries the blister has not altogether passed out of use, it is resorted to *exceptionally* rather than as a routine custom.

We cannot forbear noting in this connection that, in a recent profound treatise on "Diseases of the Lungs" (Germain Sée, Paris and New York, 1885), no mention is made of counter-irritation in the treatment of pneumonia, though nearly a hundred pages are devoted to the therapeutics of that disease. A similar remark may be made in reference to Jurgensen's standard treatise in "Ziemssen's Cyclopædia."

Doubtless the causes which have led to the neglect of vesicatories and other means of counter-irritation in acute inflammations have been manifold. Careful observers, as Rasori, Laënnec, Andral, Rostan, Louis, Fonssagrives, have pretended that they are "useless," even "injurious," augmenting the fever and the suffering. Moreover, the doctrine of the self-limited nature of all frank inflammatory diseases has been forcing itself on the attention of the medical profession. It was found, by a comparison of cases, that patients recovered in due time without the traditional blister, and it was claimed that convalescence was just as speedy and satisfactory where vesication was omitted. In the view of those who advocate the free use of stimulants in pneumonia, blistering is nonsense, being one of those means which detract somewhat from the vital well-being and comfort of the patient, the main thing being to support the strength, and especially the struggling heart, of the patient. The adoption by very many practitioners of the microbe doctrine has resulted in discredit of the blister. What can revulsion do against the microbes? With regard to cerebral inflammations, the very incurability of these affections, in the great majority of cases, has led most practitioners to be very chary of harsh measures in which they can have but an infinitesimal modicum of faith.

It must, however, be admitted that some of the truly successful leaders of the medicine

of to-day are calling for a halt in this neglect of the revulsive method. Thus, Michel Peter, in a "conference" delivered in Hôpital Necker, December, 1890, on what he terms the "contrafluxionary medication," lifts up his voice in advocacy "of a superannuated medication, rejected by many in France, completely abandoned in Germany,—*i.e.*, the revulsive method." Certainly, he says, the rubefacient or epispastic provokes a fluxion to the part irritated, which really *does* cause "derivation" of blood from the seat of lesion; this is, doubtless, a reflex act, due to a modification of the vaso-motors. This derivation is sometimes considerable, causing a beneficial depletion of the inflamed organ. He insists that his experience has again and again demonstrated the utility of counter-irritation in acute inflammations. In pneumonia the *violence* of the inflammation may be moderated by a vesicant applied at the proper time and over the inflamed region; in acute nephritis, he would rely much on leeches or cups as the best means of "decongesting" the engorged kidneys.

Advocates of revulsion in acute disease make much account of such facts as the disappearance of an eczema on the development of a pneumonia (Dujardin-Beaumetz) of a severe broncho-pneumonia on the supervention of an attack of erysipelas (Peter).

The late Thomas King Chambers, author of "The Renewal of Life," a practical treatise of clinical medicine of twenty years ago, used to treat pneumonia and pleurisy with first leeches and then poultices to the inflamed side, then by a series of blisters. His famous "jacket poultice," he believed, "raised and restored the failing functions of the tissues." The blister was supposed to act, not by derivation, as Peter believes, nor by promoting through reflex action absorption of the exudation, thus being "resolvent," as Gubler and Dujardin-Beaumetz, but "by starting a healing process on the outside skin, which shall extend to the neighboring viscus inside."

Of course, all these theories of the influence of a blister on an inflamed lung and on an exudation are still largely matters of speculation. The practical question for every physician to decide is whether the severer modes of counter-irritation do enough good to more than counterbalance the suffering and other inconveniences which are known to spring from them, and especially whether, in doubtful cases, they may save life. Experience, rather than fine-spun theories, must still decide the matter.

THE PROPHYLAXIS OF VENEREAL DISEASE.

NEVER in this world's history has the importance of prophylaxis, in its reference to all contagious diseases, been more strongly urged than to-day. The ravages of small-pox have been largely stayed by vaccination; puerperal epidemics are becoming a rarity; the spread of measles, scarlet fever, diphtheria, is largely kept under control in cities and villages where the boards of health are efficient. Much good work is being done, and more is expected in the future, to prevent the extension of tuberculosis. But what shall be said of that other great scourge of mankind, —syphilis? It is not necessary that we should institute comparisons between this and other diseases likewise of a contagious nature. Certainly it can be shown that syphilis is second to none in its wide geographical distribution and in its baneful effects. What can an enlightened hygiene and humanitarian science do to prevent the spread of syphilis?

If it were in the power of governments to isolate (and, if need be, incarcerate) all the syphilitic, and prevent the communication of the disease by them, just as they can now actually isolate lepers, the problem would easily be solved. But the utter impossibility of this is obvious. The policy of this country—like that of Great Britain in former years, with the exception of a very few cities—has been one of *laissez-faire* and indifference. This policy is undoubtedly in accordance with our ideas of personal liberty, and the widely-prevalent conviction that the suppression of syphilis, like intemperance, can only be brought about by suppression of the vice which occasions it; and that the prevention of prostitution must be accomplished by social, moral, religious, and sanitary, rather than by legislative agencies. Consequently, no check is placed on the spread of venereal disease, and he who visits brothels must feel that he does so at his own risk, that every harlot is possibly, if not probably, contaminated, and that "her house is the way to hell, going down to the chambers of death." Indeed, by many philanthropists, the foreseen consequences of illicit sexual indulgence are regarded as the best possible deterrent; and, in the language of Mr. Solly, at the Royal Medico-Chirurgical Society, "Syphilis, instead of being considered an evil, should be considered as a blessing," being inflicted by the Almighty to act as a restraint upon the indulgence of evil passions.

It is needless to say that such interpretations of the Divine will do not generally prevail, that the policy of *laissez-faire* is doing nothing to effectually stay the ravages of syphilis, and that "a new-born sense of duty" already inspires our sanitarians and philanthropists.

With regard to methods of prophylaxis available and practicable, the means at command of society are limited. The policy of repression, long tried on the continent of Europe, in the cities of Berlin and Stockholm, and, till within a few years, within the states of the Church of Rome, has been a failure. Severe laws restraining prostitution were promulgated under many of the later Christian Roman emperors; a rigorous system of prohibition was re-enacted in 1560 by the edict of Orleans, and all places of public prostitution throughout France were suppressed. Instead of these, secret establishments of prostitution were formed, "far more pernicious than those which had been destroyed;" "vice left the brothel in order to glide stealthily into families, corruption threatened to seize on all and become general," and the policy of repression, instead of checking the spread of syphilis, powerfully promoted it. The history of governmental attempts to suppress prostitution in Spain is almost a repetition of what is said about France. For a period of nearly two hundred years, the ruling powers, at the beck of the clergy, endeavored to crush out prostitution in Spain; the result was the promotion of clandestine prostitution, the general degradation of woman, and the extension of syphilis in its gravest and most virulent forms.* So complete has been the failure of every attempt to root out prostitution by force, that it is doubtful if any government will ever again attempt repressive measures.

If syphilis cannot be extirpated by a cruel and repressive policy, whose aim is to stamp out prostitution itself, what shall we say of a governmental regulative *régime* whose intent is to exclude the diseased prostitute from the practice of her nefarious profession? If all prostitutes could be under police surveillance, and compelled to undergo regular medical examinations, at stated periods not too far apart, the diseased being at once sent off to hospitals and kept there till cured, it would seem as though a great check would be made on the spread of syphilis. This is what is attempted by regulations now enforced on the continent of Europe and in some parts of the United Kingdom. Houses of prostitution are watched over by a corps of police, who also aim to compel all women practising prostitution clandestinely to register and submit themselves to sanitary regulations. A medical staff is organized, whose office is to examine all registered prostitutes, to give a "bill of health" to all such as are found not diseased, and to send to some venereal hospital all that are found to be infected. These at first thought might appear to be very important measures of prophylaxis; the diseased are prevented from pursuing their calling, and are provided with the means of cure.

If all that practise prostitution could be isolated within certain wards or streets of cities, a policy which was attempted, though unsuccessfully, under the severe *régime* of Johanna I., of Naples, and of numerous other European sovereigns for several centuries; if, moreover, all harlots could be under constant police and sanitary supervision, there might be some hope ultimately, not merely of diminishing, but even of stamping out, venereal disease. Unfortunately, there can be no such governmental control of the social evil. The opponents of the prohibition of the sale of ardent spirits affirm that prohibition drives the traffic into dens and dark places; that "club houses" and kitchen bar-rooms, more demoralizing than the saloon, come everywhere into existence, successfully defying the police, and fostering and perpetuating intemperance in its worst forms. Similar declarations have been made respecting the governmental recognition and regulation of brothels. A *Review* writer, in summing up the results of his studies (*Westminster Review*, No. clxxxiii. art. v.), affirms that "on every occasion when the experiment has been tried, prostitution *as a whole* has assumed larger and more formidable proportions, and venereal diseases, though greatly lessened among women subject to sanitary surveillance, are so enormously increased among the clandestine prostitutes, that the total number of those diseases is actually not only quite as great, but probably *very* much greater than before, . . . and there can be but one conclusion,—viz., that, as a means of lessening the amount of the diseases associated with the practice of prostitution, the system of legal recognition, toleration, and regulation always has

* See the testimony of Parent-Duchatelet and others in *Westminster Review*, No. clxxxiii. art. v.

proved and always must prove a complete failure."

The matter is treated from another standpoint by a writer in the *Journal de Médecine de Paris*, November 23, 1890. The regulation of prostitution, he says, which might have been in harmony with the state of science at the commencement of this century is in formal and absolute contradiction with the actual data of modern medicine. The venereal diseases are three in number,—blennorrhagia, soft chancre, and syphilis. The two first are essentially local; their duration is relatively short, and they can have but an indirect influence on the organism. It is not against *them* that the system of regulation is directed, but to prevent the propagation of syphilis. Now, if we adopt the usual classification of syphilis,—the stage of local lesion (hard chancre), the secondary and tertiary stages,—it is apparent, from all the data of exact observation and experience, *that the period in which syphilis can be communicated by contagion extends far beyond the period of chancre.* In fact, all through the secondary period (it is admitted that the tertiary period is exempt from the dangers of contagion) the syphilitic patient may give the disease, and not merely in the *active* phases,—where there are manifestations on the part of the cutaneous or mucous surfaces,—but even in the *latent* phases, when there are no external signs of the disease whatever. Of course, the primary ulcer is most contagious, but the instances are sufficiently numerous where, during the active manifestations of the secondary stage, syphilis is transmitted, as by wet-nurses to infants and *vice versa;* from man to woman, etc., by sexual relations; and even in the *latent* phases there is no guarantee against contagion, especially if the second party presents any abrasion or other solution of continuity on her person. Hence the only safety is in compelling the syphilitic patient to abstain from all sexual relations during the entire secondary period,—a period of several years' duration. It is evident that this necessity has not been contemplated by any system of governmental prophylaxis actually in operation.

These and other objections are urged with much force. From this point of view, the woman who is regularly examined and given a clean bill of health may be syphilitic nevertheless, and be a centre of contagion, even though there be not the smallest anatomical lesion about the genitals or elsewhere apparent to the naked eye.

Stoukowenkoff, professor of syphilography in the University of Kieff, confirms this view, also Schperk, of St. Petersburg. According to the latter, every woman who enters upon a course of registered prostitution in St. Petersburg, especially if she belong to one of the tolerated houses, becomes inevitably syphilitic within a variable time, which may be very short, but which never exceeds three years of sojourn in the establishment. Mœller believes that it is the same in Brussels, Paris, and other of the large cities that have governmental regulation. In fact, he says, in the nature of things it cannot be otherwise, for the dweller in the licensed establishment has little or no choice of "clients," and has no means of knowing whether her clients are syphilitic or not, for governmental supervision does not extend to the *male* party. Therefore it is hard to understand how any registered prostitute can long escape syphilitic contamination.

With regard to the working of the Regulation Act in certain cities in this country (as St. Louis), we hear conflicting accounts, one party strenuously maintaining that supervision is a failure, the other, that the system has, on the whole, worked well.

The only other method of prophylaxis to which we have time to allude is that which is expressed by the word *hospitalization.*

Liebermeister affirms—and here he has the support of the *Westminster Review* writer—that "the best means actually in existence for limiting the extension of syphilis is to facilitate the admission of venereal patients to the hospitals." At the Tübingen hospital, over which Liebermeister presides, syphilitic patients are received on the same footing as other patients, and, unless their condition is too repugnant, or unless there are peculiar circumstances which render their isolation necessary, they are treated in the general wards,—*i.e.*, along with patients suffering from cutaneous or other similar diseases. In other general hospitals in various parts of the civilized world there are special wards reserved for the syphilitic; in others, they are not admitted at all. Writers, as those above mentioned, have urged that there should be in every city not only *special* hospitals for venereal patients (like Loucine and Midi in Paris, where only *registered* prostitutes are admitted), but that the *general* hospitals should everywhere be more liberally opened to this class of patients. It is true that clandestine prostitutes, when suffering from syphilis, can seldom be induced to go to the special hospitals, on account of the stigma

which would be attached to them in consequence, while they would gladly enter the general hospital for humane treatment and restoration.

This may seem to be a small result of our inquiries as to methods of prophylaxis practicable, but we must remember that much more can be done than is really now being done to bring about the restoration of those that are not hopelessly diseased, and thus stay the spread of the scourge, and there will probably be no lack in the future of well-directed and systematic humanitarian efforts "to raise the fallen," and to teach communities—and especially the youth—the principles of sexual hygiene.

THE PHYSIOLOGICAL ACTION OF THE CONSTITUENTS OF THE ARTIFICIAL SALICYLIC ACID OF COMMERCE.

THE identification of the constituents of artificial salicylic acid have served as a basis for an elaborate series of investigations made by Professor Dunstan and Mr. O. F. C. Bloch, while their physiological action has been investigated by Dr. M. Charteris, the Professor of Therapeutics and Materia Medica in the University of Glasgow. Their results are published in the *Pharmaceutical Journal and Transactions* for November 22, 1890.

The value of these studies will be recognized when it is remembered that in 1886 it was discovered that the administration of the artificial product from carbolic acid, however much it may have been dialyzed and purified, rapidly produced results resembling delirium tremens; and since then many reports of bad symptoms following its use have been published in the medical journals, so that it is now generally admitted that the artificial salicylic acid and its salt of sodium are dangerous to animal life, while natural salicylic acid and its salt of sodium are not. Further, it has been shown that the difference is attributable to an impurity in the artificial acid, not a trace of which exists in the natural salicylic acid. The character of the impurities in the artificial salicylic acid, or the nature of the toxic principles contained within it, were not recognized, however, until they were separated by Professor Dunstan. Professor Dunstan has separated from the artificial salicylic acid three acids, which he recognizes as meta-cresotic acid, ortho-cresotic acid, and para-cresotic acid, the first of these occurring in the form of hard, white crystals, with a melting-point of 174.5° C.; the second occurring in the form of white, silky crystals, very light, with melting-point of 163° C.; the third being a whitish powder, somewhat like coarse flour, with a melting-point of 151° C.

The physiological action of these acids was tested by Dr. Charteris, who found that the ortho- and para-cresotic acids are slow but certain poisons, causing prostration and paralysis, affecting first the hind legs, and extending gradually over the body. The lethal dose for the rabbit is about 1 grain for every pound body-weight. The meta-cresotic acid was found to be innocuous.

As the melting-point of artificial salicylic acid is 157° C., the conclusion from these experiments seems to be that the high melting-point is not the only or the best test for purity, but a stronger test is required, and this is that the artificial crystals should be identical with those of the natural variety, for crystallization seems to be absolutely essential to secure a uniform and harmless physiological action.

The authors further conclude that if salicylic acid be prepared from synthetic carbolic acid, having a melting-point of 42° C., it then contains no impurity, but this pure carbolic acid is about three times the price of the ordinary form used, so that until this can be purchased at a cheaper rate, a more economical plan is to produce salicylic acid from ordinary carbolic acid, and subsequently to purify it. A pure salicylic acid should have a melting-point of 157°, and should occur in the form of white, separate, prismatic crystals, inodorous, tasting at first sweetish, then acid. Soluble in about 500 parts of cold water and 15 of boiling water; readily soluble in hot chloroform; soluble in chloroform and ether. Melting-point about 157° C.; dose, 10 to 30 grains.

The purified salicylate of sodium should be made by the action of the purified salicylic acid on carbonate of sodium, and should occur in the form of well-defined, white, odorless crystalline scales, having a sweetish, saline taste; soluble in $\frac{9}{10}$ part of its weight in water, or in 6 parts of rectified spirit; dose, 10 to 30 grains.

There can be no doubt but that much of the disrepute which has attended the administration of salicylic acid and its salts in rheumatism have been attributable to impurities resulting from the employment of the unpurified artificial acid; and it would seem from

the results of Dr. Charteris that, if the pure acid only be employed, its administration might be pushed to the full extent without risk, and that we may almost conclude that we have in it an absolutely reliable, safe, and almost specific cure for rheumatism and rheumatic affections. More than this, the use of salicylic acid is not confined to medicine, but has been largely used the world over for the preservation of food substances. If, therefore, it be true that commercial salicylic acid is poisonous, and the cause of its toxicity has been discovered, the importance of these facts cannot be overestimated. It is true that in France we find the use of salicylic acid for food preservation purposes condemned as illegal, but there is no doubt that it is largely so employed. Moreover, it appears that the greater part of the salicylic acid sold in Europe, and perhaps in this country, is made in Germany, and the manufacturers there practically admit that they are selling an impure article, for they place on the market what they term a crystalline acid for twelve cents a pound more than the commercial article, and an article which they term a pure acid at seventy-five cents per pound more than the former. It is, therefore, almost self-evident that the cheaper article, which is used for commercial purposes, is artificial salicylic acid contaminated with paracresotic acid. It has been stated that, in Germany especially, the beer, which is used so freely there, contains a considerable quantity of artificial salicylic acid, which, if true, would, without doubt, charge the salicylic acid with the intoxication which may follow its employment rather than the small amount of alcohol contained in it.

QUININE HYPODERMICALLY.

THERE are frequently conditions arising which necessitate the administration of quinine in a form that will be readily and promptly absorbed and distributed through the circulation. This is especially so in pernicious intermittent and remittent fevers, where the life of the patient is at stake and prompt action is demanded. There are other times when the natural channel—the stomach—is not available on account of irritability of that organ, or a catarrh of the gastro-intestinal mucous membrane, which require some other method of administration. Under such circumstances the hypodermic injection of quinine naturally offers itself, and, under certain restrictions, is very proper treatment. The various salts that have been used for this purpose are the sulphate, bisulphate, hydrochlorate, hydrobromate, hydrochlorate of quinine and urea, sulphovinate, and kinate.

The sulphate, while it contains about seventy-four per cent. of the alkaloid, should not be used hypodermically if any of the other salts are available, as it requires 740 parts of cold water and about 30 parts of boiling water to dissolve it, or the addition of a large amount of acid,—say a drop of dilute sulphuric acid for each grain of the salt. This is naturally an irritating solution, and an abscess is the frequent result if it is employed.

The bisulphate contains about sixty per cent. of quinine, or fourteen per cent. less than the sulphate, and is soluble in 10 parts of cold water and very soluble in boiling water. This is one of the salts most frequently used, as it is possible to obtain it in any ordinarily good drug-store.

The hydrochlorate is less soluble than the bisulphate, requiring 34 parts of cold water, but contains eighty-one per cent. of quinine, or seven per cent. more than the sulphate. It is soluble in 1 part of boiling water, and is frequently used by heating a mixture made with cold water until solution is effected, and injecting it hypodermically while still hot. This practice should not be followed, as the saturated solution is very apt to precipitate in the cellular tissue, with resulting irritation. It is a good rule never to use injections at a temperature above 100° F.

The hydrobromate—nearly of the same strength in quinine as the bisulphate—is soluble in 16 parts of water. Like the hydrochlorate, it is soluble in equal parts of boiling water, but the same objection applies to injections of concentrated solutions, though to a less degree, as it requires only half the quantity of water to dissolve it, grain for grain. Gubler, Raymond, and Soulez report very favorably upon its use in intermittents, which are said to have ceased after two injections of 3 grains each.

It is not superior, if equal, to the bisulphate. It is stated that a ten per cent. solution in a mixture of 25 parts of alcohol and 75 parts of water is not irritant when used hypodermically, though we should be inclined to doubt it.

The kinate, which, according to Bartholow,

is much used at Guy's Hospital, but seems to have attracted little attention in this country, need only be mentioned. It is obtained by decomposing sulphate of quinine with the kinate of barium.

The sulphovinate is a very soluble preparation, requiring only 3 parts of water at 60° F., and is readily prepared by double decomposition between the alcoholic solutions of sulphovinate of sodium and sulphate of quinine.

The hydrochlorate of quinine and urea has seemed to some investigators to possess advantages over all the other preparations of quinine for hypodermic use.

It is formed by combining 20 parts of muriate of quinine, 12 parts of muriatic acid, and 3 parts of urea, and is soluble in equal parts of cold water. It represents sixty-one per cent. of quinine, and is usually employed in a fifty per cent. solution.

Gubler, who brought forward the hydrobromate, speaks very highly of it, while Köbner seems to prefer the hydrochlorate in a solution with glycerin, but without acid, giving from 1¾ to 3¾ grains at each injection. He obtained brilliant results in cases of intermittent neuralgias, the injections being made in the back as a usual thing. Kohn claims that acute exacerbations in chronic mental disease can be aborted or cut short by the subcutaneous injection of the hydrochlorate according to Köbner's method, giving twelve grains in four punctures.

Baccelli, to whose paper we alluded some time ago, reported to the Italian Medical Society the results obtained in cases of malaria from the intravenous injection of a one per cent. neutral solution of quinine, to which a little chloride of sodium had been added, and claimed that when a proper dose was administered—say from 4½ to 15 grains—complete defervescence generally followed.

In our own experience the best results have been obtained from the use of the hydrochlorate of quinine and urea, and we recall a case where, for five days, an injection of 8 grains of this salt was made morning and evening. The site selected for the puncture was the outside of the thigh, alternating with the two legs. After the first hour there was no complaint of pain, and in no case was a sore produced.

To sum up, we would rank the preparations as follows: Hydrochlorate of quinine and urea, bisulphate, hydrobromate, hydrochlorate, and last the sulphate.

Reports on Therapeutic Progress.

DERMATITIS AS AN EXCRETORY SYMPTOM.

Dermatitis is generally regarded as a symptom, yet every-day practice shows that it is commonly treated as a disease. Inflammations of the skin, however, with their many modifications, are to a very great extent of secondary origin. Dermatitis may be held to include any inflammation of the skin characterized by various degrees and stages of redness, heat, swelling, and pain. It usually begins in the form of minute papules or vesicles, either of which may turn to pustules. The inflammation, at first punctate, becomes diffuse, or, under some circumstances, —*e.g.*, the application of a general irritant,— is diffuse from the beginning. It terminates in (1) resolution, (2) ulceration, (3) suppuration, or (4) assumes a chronic form. *Excretion* may be defined as the throwing off from the body of various products, normal or otherwise.

In a paper published in the *Medical Press and Circular* for October 22, 1890, Mr. David Walsh calls attention to the various causes of dermatitis, which, he shows, are made up of two different classes,—*first*, predisposing; and, *second*, determining,—the latter being made up of examples of various forms of irritation, which may be either external, among which he mentions the mechanical and chemical irritants, or internal irritants. The latter may be either mechanical, chiefly vascular in origin, such as blood stasis due to varicose veins or to the œdema of chronic Bright's disease, or chemical irritants, which are attributable to the circulation in the blood of substances producing dermatitis. In the latter class he mentions various products, such as arsenic, the specific poison of various diseases, such as scarlatina and their products, and the irritants resulting from faulty chemistry, such as are presumably present in gout and rheumatism. Of the latter class of chemical and organic internal irritants, the primary punctate character of rashes thus induced points to their probable origin in the coiled glands, whose function is principally that of excretion of the solid portion of the sweat.

The chief channels of exit of waste from the body are the kidneys, lungs, skin, and alimentary canal, each of which throws off water, carbonic acid, and nitrogenous matter. The balance of excretion is maintained under

varying conditions by compensatory action of the different organs. To take a familiar instance, in hot weather the sweat is abundant and the urine scanty. In an analogous manner the action of all excretory organs is largely interchangeable, a fact taken advantage of every day in practical therapeutics, when one organ is relieved by increasing the action of another, as in the familiar examples of purging, sweating, and diuresis. Similar substances, then, are excreted by the various organs, but at the same time each one favors a particular product. Nitrogenous compounds form the chief feature of kidney elimination, water of the skin, and carbonic acid of the lungs; while the alimentary canal is chiefly concerned in certain highly specialized excretions that discharge an important secondary function in digestion. The kidneys, alimentary canal, bronchi, and skin contain epithelial glands which in our present state of knowledge may be assumed to exert a selective action on the substances brought to them by the blood. The alveoli of the lungs are lined with flattened epithelium, and here the process of excretion is probably to a large extent one of gaseous diffusion.

When accidental or unusual substances are introduced into the blood they can leave the body only by the routes of normal excretion,—namely, through the epithelium of kidneys, lungs, skin, and sometimes of bowel. The exact channel of exit will be determined by varying states of organic health and activity, by external influences, and by the selective action, amount, and nature of the material to be excreted. During the process of elimination the excretory epithelium may escape injury; it may suffer only after prolonged exposure; or, lastly, it may be permanently destroyed.

Accidental or unusual substances in the blood may be discussed under the headings of (*a*) drugs, (*b*) normal products in excess, and (*c*) specific poisons, whether chemical, as that of rheumatism, or due to micro-organisms. The action of all three groups may be compared, first, in their selection of one or more modes of excretory exit; and, secondly, whether in that process glandular epithelium is or is not injured.

(*a*) *Drugs.*—Take the case of a drug like *sulphur*, which appears to be excreted from the blood by all the channels of exit, in the breath, the urine, the sweat, and the fæces. So far as we know, elimination thus takes place without injury to excretory epithelium.

Cantharidin is slowly excreted by the kidneys, setting up local inflammation, as evidenced by the strangury and nephritis that sometimes follow its introduction into the system, as by absorption from a blister. Cantharidin, therefore, appears to be selective of the kidney, and certainly damages its epithelium.

Arsenic is an instance of a drug that injures several channels of excretion. For the skin it is said to cause a kind of cancer. The gastro-intestinal irritation set up by large doses seems to be mainly due to excretion through the alimentary canal. The chief channel of exit is the kidney, which, strange to say, does not appear to be injuriously affected.

(*b*) *Normal Products in Excess.*—Urea affords a well-marked example. When present in abnormal amount, whether from overproduction or from deficient elimination, it seeks damaging excretion by all the channels through which it normally escapes, as shown by the dyspepsia, diarrhœa, bronchitis, and skin-affections of uræmia.

(*c*) *Specific Poisons,*—1, *Chemical;* 2, *Resulting from Micro-Organisms.*

1. *Chemical,—e.g.*, rheumatism and gout. The poison of rheumatism—probably lactic acid—does not seem to do much injury to excretory epithelium. That it does so occasionally, however, may be inferred from the bronchitis, the anomalous skin-affections, and the dyspepsia commonly met with in the course of the disease. As in the case of arsenic, the kidneys appear to escape. The poison of gout, on the other hand, is highly damaging to epithelium. That it is excreted generally is shown by the bronchitis and asthma, the eczemas, the nephritis, and the dyspepsia, with which the disease is characterized. Care must, of course, be taken to avoid the fallacy of including these symptoms when secondary to kidney mischief.

2. *Poisons due to micro-organisms* include those that are presumably present in specific diseases, as the exanthems. Excretory damage might equally result from the passage either of the actual organisms or of their products, such as ptomaïnes.

The products of measles is excreted, as a rule, without much damage to epithelium, although at times lung inflammations and nephritis may follow. The skin recovers readily after slight desquamation. A marked contrast is offered by the scarlatinal poison, which appears to be got rid of by all the excretory exits and to be highly damaging to epithelium. This is shown by the accom-

panying nephritis, peeling of skin, and inflammatory conditions of the throat, lungs, and alimentary canal. That there is direct excretion of the main poison by the skin may be inferred from the activity of the shed epidermis as a source of infection. In scarlet fever the dermatitis begins as a minutely punctate rash. On the hypothesis of excretory irritation, a probable explanation is that the poison seeks elimination by the coiled glands, which are thereby inflamed. Peri-follicular inflammation follows along with vaso-motor changes that lead to the diffuse rash of later stages.

Thus far it has been seen that certain drugs and specific organic poisons have more or less selective channels of excretion; that those exits are to some extent interchangeable; and, lastly, that there is a wide difference in the amount of damage inflicted upon excretory epithelium. The next step will be to trace further analogies between drugs and specific disease poisons.

The action of sulphur and of the scarlatinal poison may be compared, in so far that each seeks elimination by every possible method of excretory exit. There is this great difference, however, that whereas sulphur does not injure cells in its passage, at any rate to any appreciable extent, the virus of scarlatina, on the other hand, is highly damaging to glandular excreting tissues. In the latter respect the exanthem may be compared with gout, the chemical poison of which is extremely irritating to excretory epithelium. The two diseases may be tabulated:

	Scarlatina.	Gout.
Kidney.	— Nephritis: large white kidney.	Granular, contracted.
Skin.	— Punctate and diffuse desquamative dermatitis.	Eczemas: urticaria; acne; acne rosacea.
Mucous Membrane:		
a. Alimentary.	— Pharyngitis; dyspepsia.	Dyspepsia.
b. Respiratory.	— Bronchitis; pneumonia.	Bronchitis; asthma.

In seeking to establish excretory parallels, it is not easy to find any one drug that damages glandular exits all round like scarlatina and, to a lesser degree, gout. Were sulphur harmful to epithelium it would furnish an exact parallel. Such a result might perhaps be obtained by a combination of two or more drugs,—*e.g.*, arsenic and cantharidin. The latter affects the kidneys, while the arsenic irritates the skin, and in larger doses the intestines by elimination. It is still more difficult to name a drug that would specifically injure the remaining channel of exit,—viz., the lungs.

So far those substances only have been discussed which have a well-marked action upon epiblastic and hypoblastic structures. Next compare any drug and a disease poison having an irregular and modified action on excretory organs, but which exerts a good deal of action upon mesoblastic tissues. The author shows that iodide of potassium and the specific poison of rheumatism may be taken for this purpose.

Iodide of potassium is excreted from the blood chiefly by the kidneys, so far as we know, without damage to epithelium. Iodism may be regarded as the expression of its vicarious excretion by other channels. The skin has not the same facilities for getting rid of the drug possessed by the kidneys, and in this way the papular rash of iodism may be due to skin-glands inflamed by slowly excreting iodine. Further excretion through mucous membranes would account for the coryza, metallic taste in the mouth, and bowel symptoms. Any interference with the prompt passage of the drug by way of the kidneys probably favors the development of iodism. Whatever the real explanation of its vicarious exits, iodide of potassium appears to act chiefly on mesoblastic tissues, with occasional irritation only of eliminating channels. In much the same way the poison of rheumatism, generally believed to be lactic acid, spends most of its force on the fibrous tissues, but sometimes damages the exits, as shown by various manifestations of dermatitis, often anomalous, by bronchitis, and by gastric or intestinal dyspepsia.

Iodism may be further compared with uræmia. The drug condition may be not unreasonably regarded as the expression of an excess of iodine in the blood greater than can be at once carried off by its ordinary channel, the kidney.

In uræmia the symptoms are commonly the cumulative result of defective kidney action. There is excretory bronchitis and asthma, excretory skin-affections, and excretory intestinal troubles, such as dyspepsia, vomiting, and diarrhœa. One should be careful, of course, to avoid the fallacy of including symptoms due to poisoned nerve-centres or nerve-trunks, a remark which applies equally to all the other illustrations advanced in this paper.

The fact of varying elimination partly explains the uncertain action of many drugs,

and also the widely-differing symptoms of specific diseases. Given an abnormal substance circulating in the blood, with a choice of several excretory channels, then it may be easily imagined that a trifling cause will determine its particular exit. A check to the action of the skin in scarlatina may cause fatal excretory nephritis; whereas, a good sweating may bring out an exanthematous rash to the relief of the patient. In the case of iodide of potassium, it has been suggested that the drug may desert its ordinary exit, —the kidney,—and seek elimination by way of the skin and mucous membranes. The gouty poison, again, by leaving the kidney, may give rise to diarrhœa or eczema. In certain rare instances, the metastatic action is so marked that patients have it in their power to choose between the last-mentioned evils. Or take the dermatitis of an improperly-fed child, whose blood is laden with irritant products. Exposure to cold will very likely cause bronchitis with disappearance of the rash. The popular idea that the rash is driven inward may be expressed more scientifically by saying that the channels of excretory elimination are changed. A rational answer is afforded to the ancient problem as to whether it is right to cure a skin-trouble that is likely to be followed by internal manifestations. Such treatment is sound if one can be sure of directing excretion to a channel where serious or permanent damage will not ensue. No great harm, for instance, will be done by starting a diarrhœa to the relief of an eczema. On the other hand, to mitigate a scarlatina rash by throwing the stress of elimination on the kidneys, would probably sooner or later kill the patient.

Disease poisons take all kinds of erratic courses. Thus, scarlet fever may prove fatal without rash, without sore throat, or without kidney mischief, or a poison which ordinarily attacks epithelial organs.may spend its force on mesoblastic tissues. Gout acts in this way in its retrocedent forms, and its action then more nearly resembles that of rheumatism,—a disease where damage to epiblastic tissues is of a trifling and secondary nature.

The relation of excretory irritation to dermatitis may be more exactly illustrated by a short summary of the skin-affections of rheumatism and gout. In rheumatism, as a rule, this class of symptoms is neither well marked nor serious. Urticaria is common, and also anomalous eczematous conditions, with the local congestion round hair follicles, known as *lichen pilaris*. That the rheumatism poison is excreted by the skin is rendered more than likely by the acid and sour-smelling nature of the sweat, while its irritating effect may be inferred from the minute papular and vesicular rashes that often accompany acute attacks. Other explanations of the lesions are, of course, possible, as, for instance, where the rheumatic poison acts as a remote irritant through the nerve-centres or the nerve-trunks, or where the gland-ducts have become plugged from disuse.

In rheumatism, then, we have a specific poison that spends its force chiefly on mesoblastic tissues, and occasionally inflames the epithelium of excretory exits. In gout, on the other hand, the poison sometimes attacks the deeper parts, but far more commonly damages the cells of epiblastic excretory organs. Hence one would expect the skin complications of gout to be both numerous and severe.

All through life gouty patients are subject to eczema and urticaria, as well as to anomalous intermediate forms. A typical eczema sometimes occurs during an acute attack, and disappears under specific treatment. Asthma is common, and often alternates with eczema, or with diarrhœa; in other words, the poison is shifting its channel of elimination. On the whole, a patient may consider himself fortunate if the gouty poison seeks its expression in skin, in lung, and in intestinal troubles, thereby avoiding the kidney outlet and its consequent nephritis. Rational treatment recognizes this advantage, and aims at keeping up the action of the skin and bowels, while abnormal production of the irritant is limited by appropriate measures.

From the foregoing considerations the following conclusions may be drawn:

1. That dermatitis may be set up in a certain number of cases by the excretion of irritant products from the system.

2. That such irritants may be either chemical or due to specific micro-organisms and their products.

3. That many of the inflammations of the hypoblastic, as well as of the epiblastic, tissues are simply expressions of excretory irritation.

4. That the severity of the inflammation and consequent damage is in proportion to the specific effect of the irritant upon excretory epithelium.

5. That excretory parallels may be drawn between drugs and specific disease poisons, both as regards their channels of elimination and their harmfulness to epithelium.

6. That while excretion affords the key to a certain number of skin inflammations, it also accounts for the success of many well-established methods of treatment which aim at shifting the channels of elimination. At the same time it affords a rational basis for further therapeutic measures.

7. And finally, some observers trace the tendency to catarrhal troubles—the "eczematous condition"—to an unstable epithelium. Others refer them to disorders of the nervous system, such as trophoneuroses. While freely admitting there are wide differences of predisposition in individual skins, yet it seems probable that the dermatitis is not infrequently an excretory symptom secondary to a blood condition.

SOME POINTS ON DIETETICS.

Our advice is sought in the matter of diet in two different sets of cases. In the one set the patient is seriously ill, and disabled more or less completely from pursuing his ordinary avocations, or he is suffering from some disease which requires a special dietetic treatment, such as diabetes or gastric ulcer. In the other set the patient is only troubled with some slighter ailment or indisposition which does not incapacitate him from taking his part in the world's work, nor necessitate any deviation from his usual habits. In the former class of cases the diet often requires to be entirely transformed, the customary routine has to be abandoned, and the order, quality, and quantity of food have to be rearranged to suit the exigencies of the morbid state, with an almost complete abandonment of any thought as to what might be most suitable in health, and might best promote the success of the individual as an actor in the struggles and competitions of life. When a man is struck down with fever, or is smitten with some organic disease, we need not consider what diet is best fitted to bring out his physical and mental powers; the business in hand is to advise what is best to keep body and soul together until the fever storm be passed, or, what is best, to minimize the incidence of the organic trouble, and to lengthen out existence to the utmost possible span.

But the case is far otherwise with the second group, which forms the larger proportion of those who seek our advice, and who question us anxiously as to what they shall eat, drink, and avoid. These have no organic disease, and go about their business or pleasure as usual. They complain, perhaps, of some dyspeptic trouble, some bodily discomfort, or mental worry or weariness; or of a want of a sense of tranquil and vigorous life; or they are getting on in years, and feel the premonitions of old age; or they belong to that class of neurotics who imagine themselves ill,—persons who ponder over their sensations, and give excessive thought as to what they shall eat and what they shall drink. Most of these inquire of us what aid we can give them by a judicious management of their diet, not only to keep well and live long, but also to maintain that health with maximum vigor, both of body and brain.

Now, with regard to the first group, the advice tendered by us on points of diet displays a fair degree of unanimity. We do not differ much as to the dietetic management of a case of fever, or of diabetes, or of gastric ulcer, or, indeed, of any of the more serious forms of sickness. But, in regard to the second group, in the case of persons who are substantially healthy, the advice tendered by different practitioners is apt to show a lamentable want of consonance, or even a total contradiction.

It is in this class of cases especially that the paper read by Sir William Roberts at the opening of the current session of the Manchester Medical Society, and reported in the *British Medical Journal* for October 18, 1890, is especially important, as indicating the right method of investigating questions relating to diet.

An attentive examination of the dietetic customs of civilized races reveals very clearly that there are two distinct indications aimed at,—one is to subserve the needs of general nutrition, and the other is to subserve the needs of the higher functions of the brain and nervous system. It may be said that bread and other cereal articles, leguminous seeds, the various products of the dairy, fruits and vegetables, the harvest of the sea, and meat are designed to minister to the former purpose; and that tea and coffee and the various forms of alcoholic beverages are designed to minister to the latter purpose. With this second group should also be classed tobacco, for, although tobacco cannot be regarded as food, its use must be ranked with our dietetic customs. Strictly speaking, meat, or at least some kinds of meat, should probably find a place in both categories, for it possesses certain stimulating properties which distinguish it from vegetable and

dairy products. Tea and coffee and alcoholic beverages are sometimes branded as luxuries. What is a luxury? You cannot rightly class as luxuries—meaning thereby something that has no solid utility to the species—articles that are in general use among a successful and ascendant community. The very fact that they have attained this position is, to a naturalist, evidence sufficient that in some way or other the community as a whole, and in the long run, benefits by their use. The struggle for existence—or, rather, for a higher and better existence—among civilized men is almost exclusively a brain struggle; and these brain foods, as they have been not inappropriately termed, must be regarded as a very important part of the equipment for that struggle.

One of the most characteristic features of our national dietary is its *variety or diversity*. Not only are our several daily meals framed on a different plan, but the meals of one day differ more or less from the corresponding meals of another day. We may be quite sure that this diversity serves some useful end. In drawing up schemes of diet we are not, therefore, justified in neglecting this feature and in reducing the diet-list to a dead level of monotonous uniformity. A want of attention to this point leads us unwittingly to needlessly torment and worry our patients by placing unnecessary restrictions on their choice of food. Some of those commonly imposed are difficult to understand. Most of them probably derive their origin from some crude notions floating through the lay press, and unconsciously lodged in the medical mind. Why, for example, should tea and coffee be so frequently forbidden without any evidence that they disagree with the patient? Or why should the bland, innocuous, and easily-digested potato be so ruthlessly proscribed? Sometimes prohibition takes a wider sweep, and fruit and vegetables are included in one general condemnation. Nor are the rules laid down always self-consistent.

Dr. Roberts suggests a very good rule in regard to the regulation of the diet in cases where there are no special indications to fulfil, and that is, when the patient inquires whether he may take a certain article of food, to put these questions to him,—namely, "Do you like it?" "Does it agree with you?" If the answer is in the affirmative there is no intelligible reason why the use of that article should not be sanctioned. Such a rule is so plain and simple, and so obviously consonant with good sense, that it might scarcely appear worth while, or even dignified, to make formal mention of it were it not so well established in the experience of all that it is constantly violated.

Dr. Roberts compares the palate to a dietetic conscience at the entrance gate of food, with the appointed function to pass summary judgment on the wholesomeness or unwholesomeness of the articles presented to it. It acts under the influence of a natural instinct which is rarely at fault. This instinct represents an immense accumulation of experience, partly acquired and partly inherited. It is, of course, not infallible; no instinct is, but so close and true are the sympathies of the palate with the stomach and the rest of the organism that its dictates are entitled to the utmost deference as those of the rightful authority in the choice of food. In addition to the importance which is to be given to the teachings of the palate, which he states it is necessary to study in individual cases, attention is called to the advantage to be gained from change of diet. A course of two or three weeks of vegetarian regimen occasionally proves most grateful, especially in the case of habitual heavy feeders. Similarly the total abstinence from alcoholic beverages is often highly salutary, and most of all for those whose daily potations are on a liberal scale. These two examples represent the experiments which are indicated in their absolute strictness in but few cases, and Dr. Roberts shows that slighter alterations are often of signal benefit,—thus, changes from tea to coffee or cocoa, from one kind of alcoholic beverage to another, from one sort of bread to another. Again, a revision of the order and times of the meals is sometimes beneficial. It is also in some cases effective in removing troublesome insomnia to make an alteration from mid-day dinner to a late dinner or substantial supper. It should, however, be borne in mind that such effects are merely temporary, and that their benefits are exhausted within a month or so, and then a return to the old diet or a new change may be desirable. Another point of practical interest is this, that when certain articles disagree, it is better to lessen the quantity than to forbid; if fruit or vegetables prove difficult of digestion, it is certainly unwise to prohibit them altogether. It will generally be found that if the quantities are reduced to a certain level they can be tolerated and enjoyed. The antiscorbutic properties of fruit and vegetables cannot be safely foregone, and a very

small proportion suffices to fulfil this indication. Again, in reference to the use of potatoes, people do no doubt stuff their stomachs with potatoes, which the organ finds difficult to deal with. But many persons cannot enjoy, or scarcely eat, their dinners without potatoes, and to abstain from them is a great privation. Nor is this necessary; a reduced allowance will solve the difficulty perfectly. Then, again, some persons are abnormally sensitive to tea or coffee or alcoholic beverages, and suffer discomfort from the quantities usually taken. But abnormal sensitiveness is not a proof that the incriminated article is unserviceable, and a diminution of the quantity may prove a better remedy than total prohibition.

Finally, Dr. Roberts adverts to the necessity for revision of the diet to meet these changes in the type of nutrition which naturally takes place as the individual travels on from youth to age. In the normal course the palate and appetite adjust themselves automatically to these altered conditions, and there is a lessened intake of food, but sometimes these adjustments lag behind, and the power of taking food remains unaltered, while the assimilative powers are on the wane. Then some form of nutritive disorder necessarily follows. In most of these cases, but not in all, there is a tendency to stoutness. There are indications of digestive difficulties and of engorgement of the abdominal organs, and signs of that vague condition termed latent or undeveloped gout. The early recognition of this condition is very important, for thereupon depends the prevention or postponement of degenerative processes which hereafter prove formidable. In this conjuncture the observant medical adviser may render invaluable services in detecting the maladjustment, and in taking timely steps for its correction. The most obvious indication is to lessen the quantity of food, and where difficulty is found in controlling the actual amount of food taken, where the appetite is yet strong and the powers of gastric digestion are abnormally active, the less concentrated forms of food are here a useful resource,—green vegetables, salads, and thin soups,—which help to fill the aching void without adding materially to the albuminoid and fatty ingredients of the meal. Tea and coffee are also serviceable in allaying an unseasonable craving for food. A stiff cup of tea or coffee shortly before dinner certainly takes the edge off a troublesome appetite. It is, however, well to proceed cautiously in this direction, for the promptings of nature are not to be lightly set aside. The effects of a contracted diet should be carefully and patiently watched, with an open mind for every sign or suggestion, whether of warning or retreat, or of encouragement to advance. In middle life particular attention should be paid to the quantity of alcoholic beverages. As a very general rule, the tolerance for these articles diminishes with advancing years, and it is necessary nearly always with persons who have used them freely to reduce their quantity when middle age is reached.

In regulating the diet of substantially healthy persons, it is imperative to beware of hard-and-fast lines. Cases of this group are very diverse; scarcely any two are exactly alike, and their management is complicated often by moral and social considerations which are difficult to justly estimate. We can only hope to avoid serious errors by a patient investigation of each particular case, and by bringing to bear upon it a full knowledge, combined with a large infusion of common sense.

A NEW METHOD OF BLEEDING IN SOME FORMS OF PULMONARY CONGESTION.

The subject of bleeding, local or general, is one which is not now much discussed or referred to except in a few rare and exceptional cases. This is to some extent due to bleeding having gone out of fashion, and also largely to the fact that when unskilfully used it is a dangerous and even fatal line of treatment. Under the head of local bleeding are classed some of the ordinary methods which are still in use, and deservedly so, such as leeching, cupping, and the like, while general bleeding, as accomplished by venesection or arteriotomy, is now only rarely practised. That bleeding locally does do good in suitable cases there is no denying, and it is equally true that lives can and will be saved by judicious and timely venesection. This phlebotomy is not one practised in cases of acute febrile diseases, but is rather an extension to another organ of the practice of hepatic phlebotomy as performed by Dr. Harley. This, there is no doubt, has a most beneficial effect in the cases of hepatic congestion in which it is performed. Such a condition can only be very indirectly and somewhat slowly affected by either general depletion or vigorous leeching and counter-irritation over the hepatic regions, for obvious elemen-

tary anatomical reasons. But through it we have the direct method, which, apparently in proper cases and when properly performed, is not attended by risks of effusion or subsequent peritonitis, local or general. That a similar procedure might be of use in the case of engorged lungs not in a state of acute inflammation occurred to MR. J. CHRISTIAN SIMPSON, and he demonstrated its practicability, though rather by accident, in a case of severe cardiac pulmonary congestion which came under his care in August, 1887, notes of which he publishes in the *Lancet* for Novber 1, 1890. The patient was an elderly woman, in whom there was considerable loss of compensation, with mitral regurgitant murmur. The dyspnœa was distressing, and the dulness at the base of the lungs was so absolute and wooden, and the breath-sounds so distant, that pleural effusion seemed probable. Accordingly he introduced a fine aspirator-needle, but no serous fluid escaped, and, on thrusting the needle farther in, dark venous blood readily flowed. Although he was not allowed to carry the bleeding as far as he wished, this case showed the ease with which direct local depletion of the lungs could be performed, and he soon had an opportunity of repeating the experiment so indicated in the case of a woman who was the subject of chronic Bright's disease, which did not improve under dietetic and other treatment. One day coma commenced with fibrillary muscular twitchings and intense dyspnœa, accompanied with œdema and congestion of the lungs. Under these circumstances venesection was indicated, as ordinary treatment failed to produce relief. In order to render the pulmonary phlebotomy as safe as possible, the aspirator was used, and the largest canula thrust into the lung-substance at the level of the ninth costal interspace on the left side, the absence of pleural effusion having been previously ascertained. No blood flowing after various manipulations, reducing and increasing the suction power, the whole of the aspirating apparatus was removed, and very shortly afterwards there was a free flow of blood from the canula, which was left *in situ*. After the withdrawal of twelve ounces of blood, the canula was held *in situ*, with the finger over the end to allow a clot to form, and then it was slowly withdrawn altogether. A piece of plaster was applied over the puncture, but a flannel bandage could not subsequently be retained in position. The patient was immediately and markedly relieved, both as regards the cerebral and pulmonary conditions. No effusion took place, there was only trifling hæmoptysis, and a suspicion of a small patch of pleurisy, without a rise of temperature. She remained in a greatly improved condition for a considerable time after this, though she ultimately died comatose.

A third case similarly treated was one of almost complete breakdown of compensation in cardiac disease, there being double mitral and aortic systolic murmurs, as well as well-marked dilatation. Stimulants and cardiac tonics were tried without avail, and, as the cyanosis was somewhat rapidly increasing, the author again tried pulmonary bleeding, in a similar manner, and with a similar immediate beneficial result, which continued for about thirty hours, when the patient died quite suddenly of syncope after some exertion in bed.

The fourth case was one which also terminated fatally, death being due to uræmic convulsions. In this case, instead of a flow of blood, the œdema was so pure that only serous fluid escaped very slowly, and coagulated quickly, thus rendering the process futile. In spite of brachial venesection, which was immediately performed on account of the urgent symptoms, this patient died of the convulsions.

The author believes that, provided suitable cases are chosen and that the operator has the manipulative skill requisite for such an operation, the operation is by no means an unjustifiable one, and is not to be regarded as dangerous. Of course, the cases reported were all of a hopeless character, and only palliation could be expected except in the cardiac case,—the third reported,—and in this valuable time had been lost in medical treatment before the permanent value of such an operation could be tested.

Whether it would be useful as a *dernier ressort* in cases of acute uræmia with pulmonary symptoms remains to be seen; but there was certainly immediate improvement in the cases where blood was abstracted. The aim and object is to try to get the good of venesection without such a loss of blood and its consequent retardation of convalescence. The process is analogous to a pulmonary apoplexy, which is recognized as being of the utmost benefit in certain cardiac cases, and the pulmonary lesions in both cases have a strong similarity. The broad indications for this seem to be that the case is one which has (1) extreme pulmonary congestion and œdema; (2) absence of effusion into the

pleural cavity; (3) general venous stasis and cyanosis, all of which may occur in the progress of certain heart- and kidney-affections; and (4) that other treatment, medicinal and mechanical, had failed to relieve the symptoms. The coexistence of such congestion without pleural effusion is somewhat rare, and therefore this limits the practice; for the mere aspiration of the pleural effusion is almost invariably followed by such relief in cardiac cases that venesection is not required. It is, therefore, a necessary preliminary procedure to negative the presence of effusion in any quantity that would embarrass the heart's action and impede the pulmonary circulation. To do this thoroughly an exploring needle must be used. The condition of the lungs in a suitable case is such that, as regards the danger of subsequent pneumothorax, little or no air is being interchanged at the proposed seat of puncture, and the elasticity of the lung is quite sufficient to prevent any serious oozing place.

The method of procedure may now be considered *seriatim*. 1. What side is to be the seat of puncture? As a rule, Mr. Simpson thinks, the right side should be chosen if both sides are equally free of effusion, or are generally engorged. The reason for this is evident when it is remembered that such cases usually lie on that side, and consequently the congestion will be greater, and the rest to the lung afterwards will also be greater than on the left side. 2. The site of puncture should be not higher than the ninth interspace posteriorly. 3. The needle to be used is the largest usually supplied with an aspirator, the parts used being the canula and the corresponding trocar and fittings, but it will be found advantageous in some cases to use a probe of a size smaller than the canula. 4. Mode of puncture. This should be done in one thrust, so that there be no danger of one or more small punctures of the lung. If this be not done, the patient will cough and be troublesome, as the visceral layer of pleura is very sensitive; but with one thrust there is little or no discomfort. The depth of canula introduced need not be great at first, and it could only be by great carelessness that any vessel of any size could be injured. The *tactus eruditus* will at once advise the operator of the fact that the end of the canula is in a free space containing fluid. 5. The canula being steadied and the needle withdrawn, the operator should wait for a few seconds to see if any blood flows. If not, the canula should be moved, so as to produce slight laceration, then slightly withdrawn, and usually there is a free flow. If clotting takes place, the smaller probe should be introduced and the canula cleared. The probe being smaller, allows of blood to flow, although it may be *in situ*, and keeps any lung-tissue from the end of the canula. 6. The amount of blood to be abstracted varies according to the case and the results produced, it being, as a rule, less than would be required were venesection adopted. 7. The extraction requires some care. The finger should be placed on the angular aperture of the canula, and either the needle or probe introduced along the canula, and kept there for a few minutes, to allow of clotting to take place in the lung, and then slowly withdrawn. In this way there will be no subsequent hæmothorax or pneumothorax, and slight, if any, local pleurisy. 8. The local after-treatment consists in applying a piece of plaster to the puncture, and a bandage, if the dyspnœa will admit of it.

EXPERIMENTAL INVESTIGATION OF THE ACTION OF CHLOROFORM AND ETHER.

Dr. John A. MacWilliams, in an elaborate "Experimental Investigation of Chloroform and Ether," an account of which has been published in the last four numbers of the *British Medical Journal*, reaches the following conclusions (*British Medical Journal*, October 25, 1890):

1. During the chloroform anæsthesia the blood-pressure is lowered and the heart's action is weakened.

2. Dilatation of the heart occurs to an appreciable extent, even when chloroform is administered gently, mixed with abundance of air (under four per cent. of chloroform vapor in the air).

3. Dilatation may occur even before the conjunctival reflex is abolished.

4. The dilatation affects all parts of the heart more or less, the left side as well as the right. It is not due to changes in the pulmonary circuit.

5. The dilatation is not due to the accompanying fall of pressure, to the diminished resistance to the ventricular systole, or to the diminished blood-supply through the coronary arteries. Dilatation does not result from a similar fall of pressure brought about by means other than chloroform; for example, arterial relaxation caused by section of vasomotor nerves. Dilatation under chloroform often occurs very quickly, before there is any fall of pressure. Moreover, when the dilata-

tion has followed a fall of pressure, it is not removed by artificially raising the pressure; for example, by compression of the abdominal aorta.

6. There is no distinct change in the rate of the heart's action when dilatation occurs. A sudden and complete cessation of the cardiac rhythm is never caused by the inhalation of chloroform. Cardiac failure occurs by a more or less sudden enfeeblement and dilatation of the organ, not by a sudden complete cessation of rhythm.

7. The tone of the heart-muscle is depressed, the cardiac walls become relaxed, and the functional efficiency of the organ is impaired.

8. When the heart becomes greatly dilated it fails to be an effective force in keeping up the circulation, while its rhythmic movement still continues, though so feebly as to be inefficient.

9. Cardiac failure sometimes occurs in this way a considerable time before the respiration stops, though generally the respiration stops before the heart has become incapacitated.

10. The failure of artificial respiration to bring about recovery (in some cases of chloroform collapse), when begun immediately after the spontaneous respiration and distended state of the heart, which has become unable to maintain the circulation. Hence the supply of fresh air (by artificial respiration), free from chloroform, cannot be taken advantage of.

11. The depressing influence of chloroform on the heart—leading to dilatation of its cavities—is not exerted through the vagus nerves, but is a direct effect of the drug upon the cardiac mechanism. Section of both vagi does not obviate the weakening and dilating influence of chloroform upon the heart.

12. The weakening and dilating effects of chloroform are sometimes manifested in tolerably equal degree on both auricles and ventricles; but sometimes more readily upon the auricles, and at other times upon the ventricles.

13. A peculiar periodic depression of the ventricular action sometimes occurs during recovery from the primary effects of chloroform.

14. The contrast between the relation to the heart's action of chloroform and ether in anæsthetic doses is very marked. With chloroform, cardiac dilatation frequently occurs—and often, indeed, a very marked dilatation—before the conjunctival reflex is abolished. With ether, the induction of anæsthesia with complete abolition of the conjunctival reflex has not been attended by any noteworthy dilatation; indeed, effects of a stimulating character have sometimes been observed, and the peculiar periodic ventricular depression sometimes following chloroform has been seen to be removed.

15. Under the influence of chloroform a temporary slowing of the heart's action sometimes occurs,—from asphyxial conditions or from sensory stimulation during imperfect anæsthesia. This slowing is quite different in its nature and causation from the enfeebling and dilating effect already mentioned. The slowing is not due to direct influence of chloroform on the heart, but is indirectly brought about through the vagus nerves. It does not appear to be dangerous in the healthy animal.

16. The occurrence of fibrillar contraction (delirium cordis) does not appear to be a primary mode of cardiac failure from the inhalation of chloroform in the healthy animal, though it may sometimes supervene when the heart has become distended and incapacitated by chloroform.

17. The fall of blood-pressure under chloroform is in its earlier stages due mainly to the depressing effect of the anæsthetic on the vaso-motor centre, preceded often by a slight stimulation; the later stages are associated with failure of the heart as well as of the vaso-motor centre.

18. The relative occurrence of cardiac dilatation and vaso-motor depression varies. Sometimes the heart begins to dilate early,—before there is any fall of pressure; at other times a large fall of pressure may occur before cardiac dilatation becomes marked.

19. The lowering of the blood-pressure is in a certain sense protective; it retards the access of more chloroform to the vital organs. But, on the other hand, the fall of pressure may become excessive and produce dangerous effects.

20. In certain circumstances, when chloroform is very suddenly taken in, a dangerous dose may be absorbed, and the heart may become seriously affected *before* the vaso-motor centre has had time to be much depressed.

21. When a fall of carotid pressure has been brought about by the *gradual* inhalation of chloroform in the ordinary way, firm pressure applied to the abdomen causes a marked rise of pressure,—very much more than can be obtained by inversion of the ani-

mal. And even when the fall of pressure is due to the *sudden* inhalation of an excess of chloroform, pressure on the abdomen commonly, but not in all cases, leads to a decided rise in the carotid pressure. The existence of cardiac failure may prevent the possibility of such a change.

22. Changes in the respiration exert a most important influence upon the effects of chloroform administration. An amount of chloroform which can be given with safety during easy breathing may speedily become dangerous during deep, rapid respiration.

23. Free dilution of chloroform with air—the restriction of the percentage of chloroform vapor to four or four and a half per cent.—gives no security against an overdose. A percentage that gives safe anæsthesia during ordinary breathing may lead to fatal collapse if given during exaggerated respiration.

24. Changes in respiration may be excited by sensory stimulation (operative interference, too strong chloroform vapor, etc.) during imperfect anæsthesia. Rapid, gasping respiration occurring in such circumstances is usually accompanied by a rise in blood-pressure, and, as there may be already a considerable amount of chloroform in the circulation, there occurs a combination of circumstances specially favorable for the speedy and sudden development of dangerous collapse.

NOTE.—I hope soon to publish tracings illustrative of some of the experimental facts described in this report.

THE TREATMENT OF INTERNAL HEMORRHAGE.

There are few more trying positions which the practitioner of medicine can find himself suddenly forced to occupy than that of facing a severe internal hemorrhage, whether cerebral, pulmonary, gastric, intestinal, or uterine. It is with the view of summing up our knowledge on this subject, and to aid the practitioner in such disturbing emergencies, that we largely reproduce the paper with the above title, published by DR. JOHN FERGUSON in the *New York Medical Record* for November 1, 1890.

In the first place, it is very apparent that the amount of blood that will flow through a rent in the wall of any vessel must be greatly influenced by the total amount of blood in the system and the amount of pressure upon the vessel from within. This being the case, the first step to take in dealing with a hemorrhage is to cut off the supply of liquids. In this way the amount of blood is kept down, while it becomes thicker in quality and better fitted for the forming of a good, firm clot in the torn or ruptured vessel. Another step in the same direction is to reduce the volume of blood by actively eliminating water from the system. The hypodermic injection of pilocarpine rapidly unloads the body of water and inspissates the blood left behind, lessening thereby the freeness of the flow. This would not, however, be suitable in cases of pulmonary bleeding. Other diaphoretics might be selected, according to the judgment of the physician, or the nature of the case and the condition of the patient.

Another group of remedies is of much value in dealing with such cases. Those purgatives that produce copious watery stools, and at the same time are not irritating or depressing, must be placed high on the list of things we may use for the relief of the sufferer intrusted to our charge. Of these purgatives there is none so good as Epsom salts, —the sulphate of magnesium. When given in saturated solution, without water, in free doses and oft repeated, very free watery evacuations are produced, the amount of fluid in the vascular system is speedily lessened, and the hemorrhage to this extent controlled. By maintaining this action for some time, the ruptured vessel has time to heal, because the pressure is largely taken off it, and it is put into the condition of rest. In addition to this, however, the blood is thickened. In some cases of cholera—sporadic or epidemic—where the rice-water stools have been very abundant, the blood becomes so reduced in volume and so inspissated as not to flow from a wound made in a large vein. In the event of the hemorrhage being due to the ulceration of typhoid fever, this plan could not be had recourse to, though it might be used with advantage in the bleeding of a gastric ulcer. In the hemorrhage, often so free, from soft and rapidly-growing uterine fibroids, it is specially useful if continued long enough,—say for months.

Some persons have a strong tendency to bleed, and any hemorrhage is difficult to stay. In such conditions Dr. Ferguson states that he has found the following formula to be highly serviceable. Mix one ounce each of absolute alcohol or oil of turpentine in a glass or wedge-wood mortar; to this add very slowly, stirring all the while, one ounce of

sulphuric acid. After all chemical action is over, the mixture may be bottled ; of this, 10 or 15 minims may be used every two, three, or four hours, as needed.

In the event of a very severe post-partum hemorrhage, the medical attendant may try ergotin hypodermically, or hot vaginal or rectal injections ; but these may fail. It is a belief, not yet quite dead, that the uterine sinuses are closed by clots. This is quite erroneous. The uterine vessels and sinuses are interlaced by muscular fibres, and it is the contraction of these that arrests the hemorrhage. This muscular tissue, as it were, ligates the vessels that would bleed, and, so long as the contraction is good, there is no danger. Now, for the maintenance of this tonic action of the muscular tissue in the uterus, Dr. Ferguson has found the application of heat to the lumbar portion of the spine very useful. It stimulates this portion of the nervous system by bringing more blood to it. There is a greater influx of nerve-energy to the uterus and contraction is brought about. It is true that the uterus seems to be very independent of the spinal cord, and labor may take place in a paraplegia. This does not, however, invalidate the fact that heat—applied to the spine by a large sponge dipped into hot water—does much good in the way of rousing the uterus to action. But when all things fail, as fail they will at times ; when ergotin, acetate of lead in large doses, hot injections, and heat to the spine disappoint us, we have one last resort,—tampon the uterus and vagina thoroughly with iodoform gauze, or, if this is not at hand, some cloths to which glycerin is added. This plan will seldom fail. The bleeding is soon arrested, the uterus begins to contract, tone in its walls is secured, and one can feel at ease that the patient is out of all immediate danger.

As a means of arresting hemorrhages and gaining time for other remedies, Dr. Ferguson suggests the following plan, one great feature of which is that it is always available and does good. It is applicable to cases of capital operations on the body, such as the removal of large and vascular tumors from the neck, the female breast, etc. The plan is simply to tie bands around the legs and arms close up to the body. This arrests the return of blood to the body, while the flow of blood into the limbs still goes on. By this means a very large amount of blood in the body is rapidly collected into the four extremities and the pressure taken off the central vessels.

ABUSE OF DRAINAGE OF WOUNDS.

At the meeting of the Medical Society of London, held October 27, 1890 (*Lancet*, November 1, 1890), MR. LOCKWOOD read a paper on the "Abuse of Drainage of Wounds." He began by remarking on the great benefits which had accrued from the systematic drainage of wounds, and proceeded to argue that this had led to considerable abuse of the process. Although of late there had been some reaction, he thought it not improper that the subject should be discussed. The necessity of drainage in the case of wounds made by the surgeon in healthy tissues was first discussed. An ideally-successful wound was defined as being one which healed without constitutional disturbance and under a single dressing. Obviously the insertion of a drainage-tube rendered this consummation impossible, as the dressing had to be changed for its removal. Next the inefficacy of drainage-tubes was mentioned, and cases given to show how frequently, when the wound was aseptic, they were found blocked with blood-clot, the dressings being practically unstained. The asepticity of some of the cases had been properly ascertained by the inoculation of cultures. A similar objection was taken to soluble drainage-tubes,—namely, that they were just as liable to become occluded. It was quite unnecessary to drain with the view of giving exit to blood, as by proper precautions none need be effused. Further, should any collect, it did no harm so long as the wound was aseptic. The occurrence of serous inflammatory effusion was next discussed, and first wounds were described which had been treated without drainage, and in which none had been seen. These wounds included amputation of limbs, extensive amputations of the breast, and operations for hernia and for the removal of tumors. Some of these had been tested and found aseptic. Next, similar wounds were referred to in which some effusion had occurred, but in which it had been harmless. Wounds in which there was much effusion had been tested, and always found to be septic. The latter condition was thought more potent than chemicals, foreign bodies, or want of pressure in causing effusion and subsequent suppuration. The importance of the systematic testing of wounds was referred to. Many so-called aseptic wounds were in reality septic. Whenever it had been necessary to remove button sutures or drainage-tubes in order to dress a wound, and the wound had been proved aseptic, the greatest confidence was felt in the ultimate result, and the

first dressing was always the last. Anything short of asepticism was unsafe, especially if drainage was omitted and the wound put up to heal under a single dressing. There was no method which allowed harmless contaminations to enter but excluded the harmful. Cases were quoted of severe wounds treated without drainage, and which healed beneath a single dressing. They easily carried off the palm for rapidity of healing, painlessness, and economy. The use of drainage in abdominal wounds was mentioned. In such cases drainage was the exception and not the rule, and the same ought to apply to other operations. There were some regions in which the omission of drainage seemed hazardous, particularly in those which involved the scrotum, the triangles of the neck, and perhaps the loose tissues within the abdomen. Wounds in tissues in which septic processes were established needed drainage, although cases were mentioned which seemed to show that a distinction ought to be made between those which were chronic and those which were acute. The relation of the constitutional state of the patient to drainage was next mentioned, and the question of auto-infection of wounds mentioned, and a supposed instance given. Last, the precautions which had been adopted were described. Stress was laid upon the preparation of silk (which was alone used for sutures and ligatures), sponges, and instruments, the latter by boiling in soda and water. The five per cent. carbolic gauze and alembroth wool seemed to make the best dressing, the whole being adjusted with Martin's rubber bandages.

Mr. Reginald Harrison, though admitting the usefulness of the drainage-tube, could not regard it as an unmixed blessing. There were certainly many conditions under which it could be entirely dispensed with.

Mr. Alban Doran said that no appliance introduced within the last twenty years had done more good in abdominal surgery than the drainage-tube if properly used. It was a contrivance intended for permitting the pumping out of fluid from the abdominal cavity, and was one of the greatest safeguards after adhesions had been broken down. It had been abused, because it had been used where not wanted, and when employed it had often not been used properly.

Mr. Rose believed that a drainage-tube during the first twenty-four hours was useful to take away excess of blood. When the tube was blocked with blood, it had already done its work.

Mr. H. Allingham thought the use of a drainage-tube was often better than employing the amount of pressure necessary to keep the wound in accurate apposition.

Mr. Lockwood, in reply, thought that a drainage-tube put in and taken out again within twenty-four hours simply to remove blood that should have been stanched at the time of operation was a confession that the highest ideal in surgery was not being aimed at. He was not now using so much pressure as he did at first. He regarded the method he advocated as economical both as regarded time and expense.

THE TREATMENT OF ANEURISM BY THE FORMATION OF WHITE THROMBI WITHIN THE SAC.

In certain regions of the body, such as the extremities, aneurisms can be so treated by the application of an aseptic ligature applied to the vessel on the proximal side of the aneurism that this mode leaves little to be desired. There are occasionally, however, even among aneurisms of the extremities, instances of arterial disease of such a nature and extent as to render the application of a ligature upon a large vessel in its continuity hazardous. A mode of treatment which would subject the patient under such circumstances to less risks would be advantageous. In intrathoracic aneurisms the Hunterian operation is impossible, and equally so in a practical sense on the abdominal aorta. Distal ligature for aneurism at the root of the neck, though many times successful, especially within recent years, involves a serious operation, often complicated by the presence of the tumor, and there are cases in which it has entirely failed in effecting a cure. For the last fifty years efforts have been directed to effect cures of aneurism by the administration of internal remedies, by the lowering of the vitality of the body by starvation, with the object of inducing marasmic thrombosis; and where these failed, as they very frequently did, attempts were made, by acting directly upon the blood-stream, to bring about coagulation. It is not intended to give a history of these methods, of which you are fully cognizant. Many of them are highly interesting in detail; all of them point towards a common end, and most have in them some elements of success. Most investigators who have endeavored to effect direct occlusion of an aneurism by the introduction of foreign bodies into its sac, have

aimed, as far as the *rationale* of their proceeding is intelligible, at producing such an effect upon the blood-stream as to cause coagulation of the blood contained in the sac. When success attended their efforts a red thrombus resulted within a very short period. Retardation or complete cessation of the flow of the blood through the aneurism greatly facilitates the red thrombus formation, the entire mass of blood coagulating simultaneously. This is seen in popliteal aneurism when cure results from extreme flexion of the leg upon the thigh. Galvano-puncture, while producing coagulation of the blood at the positive electrode, does not arrest the flow of the blood through the vessel, and one important element in the formation of red thrombi is consequently wanting. Failure to effect a cure from galvano-puncture is, therefore, the rule. Many have preferred to stuff the cavity of an aneurism with quantities of wire, horse-hair, or catgut, which were intended to effect the double object of acting as foreign bodies, and at the same time to retard the flow of blood through the sac. Some who employed acupuncture arranged the pins with the intention of causing an obstruction to the flow of blood, and so favoring the commencement of coagulation.

Is a red thrombus formed within an aneurismal sac best suited for its ultimate occlusion, and are the means at our disposal sufficient to command the production of red thrombi in the presence of a vigorous flowing blood-stream? Let us look briefly at the various kinds of thrombi, and the manner in which thrombosis takes place. A red thrombus at an early stage consists of masses of fibrin, enclosing red corpuscles and a few white ones, the whole saturated with serum. As the fibrin contracts, this serum is exuded, the mass diminishes in bulk, and, though at the outset it may have filled the sac, thereby producing occlusion, yet, owing to this shrinking, the blood-stream may be re-established, especially when the walls of the aneurism are not collapsible. This has happened in many instances where occlusion lasted some hours, or even days, after which slight pulsation returned, and ultimately the volume of blood passing through the aneurism became as great as before the formation of the red thrombus. Shrinking continues in this form of thrombus for a considerable period, and may lead, weeks subsequent to the occlusion, to a portion of the channel becoming patent. After occlusion has been effected, the red thrombus, which is simply a mass devoid of vitality, undergoes one of several changes. The blood-clot may be acted on in the same way as it would be were it in a wound. It may be penetrated by leucocytes, which absorb the thrombus and replace it by fibrous tissue. This would be the most favorable termination for red thrombi within an aneurism, but it is seldom seen. Again, the thrombus may become converted into red or into yellow softening. The former is serious, not only from the transformation of the mass into reddish or grayish disintegrating pulp, but from the fact that some of this disintegrating material may find its way into the blood-current and give rise to emboli. Yellow softening is even worse, as here it is not a mere disintegration of the blood-clot, but an intense inflammation of the walls of the vessel, ending in pus-production, dependent, in all probability, on septic contamination. The wall of the vessel participates in the softening process; hence the blood may burst into the surrounding tissues. The blood-current may also carry portions of septic detritus into the circulation, causing septic infarctions. The latter form of softening is to be guarded against by preventing septic matter being introduced from without, and by rendering aseptic, prior to operation on the aneurism, abscess, or suppurating ear which the patient may have. White thrombi are not liable to either of these forms of softening; the first could scarcely occur in it, while the second is preventable.

The attempts to produce coagulation in aneurismal sacs by the introduction of foreign bodies into their anterior, although occasionally successful, have failed, as a rule, especially on aneurisms at the root of the neck or where the circulation could not be controlled on the proximal side of the sac. Those who have endeavored to produce red thrombi for the purpose of occluding an aneurism under these circumstances have omitted one of the most important elements, without which success cannot be secured,—namely, placing the blood in the sac in a state of rest. In intrathoracic aneurisms and those at the root of the neck the arrest of the blood-stream is an inherent impossibility, except by occlusion of the sac; and, therefore, in them this mode of treatment is not applicable. When red thrombi are formed, in the presence of a vigorous blood-stream, they are more liable to disintegration and absorption than to organization. It is in this way the red thrombus formed on the positive elec-

trode by galvanism is so often of no benefit. But why are there some successes, complete or partial, and how do these arise? It is due to these successful stray cases that a half-hearted belief in this line of treatment still lingers. In the majority of such subjected to pathological examination at various periods subsequently to the complete or partial cure, the sac has been found to contain white thrombi, which, it is assumed, resulted from organization of the red thrombi. Thus, for instance, in certain aortic aneurisms treated by galvano-puncture white thrombi have been noticed developed at the points punctured by the needles. These were attributed to the galvanism, whereas they were due to the deranged vessel wall setting up a reparative inflammatory process. This interpretation of the phenomenon receives support from the fact that white thrombi may be produced by the penetration of the vessel wall without galvanism. Let us look briefly at the characters of white thrombi.

When the current is unobstructed, white thrombi are prone to form in the interior of the vessel, at a spot where irritation has been induced, and from which the endothelium has been removed. At such a part leucocytes, derived partly from the vessel wall, but mainly by segregation from the blood-stream, become firmly adherent to the vessel. When this process has been initiated, it tends to grow by superimposed accretions, so that a parietal thrombus may proceed till complete occlusion occurs. The leucocytes shortly after their deposition disintegrate into a finely granular fibrin which shrinks, but the shrinkage is by no means so great as that which occurs in red thrombi. Where the shrinkage is completed, the white thrombus chiefly consists of an inert body capable of, aud subject to, further transformation. The various forms of softening to which red thrombi are subject seldom affect white thrombi. Were the damage to the vessel wall or surrounding structures excessive, puriform softening could occur, especially in the presence of septic matter. The latter is in the majority of cases avoidable. The white thrombus is prone to undergo replacement by vascularized fibrous tissue, the granular fibrin originally deposited becoming absorbed, and taking no share in the new formation. The first step in the process is the infiltration of the vessel wall with the leucocytes derived from the vasa-vasorum and the neighboring vessels. These penetrate the thrombus, becoming converted into formative cells, which develop into fibrous tissue abundantly supplied with blood vessels. In this way a thoroughly vascularized connective tissue, blended with the vessel wall, is formed throughout. The vessels of this new-formed fibrous tissue are continuous with those of the vasa-vasorum.

It is possible, when in an aneurism the parietal thrombus in process of development has reached the level of the internal surface of the normal arterial tube, that it may become covered with endothelium. If so, a new channel would be formed with very thick external walls. The restoration of the lumen of the vessel, while securing the cure of the aneurism, would be an ideal result, which, however, has not yet been obtained. That the thrombus, especially after its development into fibrous tissue, could become covered by endothelium is evident; but under favorable circumstances it may even occur while the thrombus is in an earlier stage. A somewhat analogous process is sometimes seen on the surface of a wound; fibrinous exudations containing many leucocytes may become covered by a layer of epithelium, the formation of the latter keeping pace with the advance of the living infiltrating leucocytes. What occurs with epithelium may take place with endothelium under favorable conditions. Not unfrequently in the ligature of an artery the endothelium has been seen to cover the free portion of the thrombus. It is true that in aneurisms undergoing natural cure the thrombi are very slowly and imperfectly replaced by fibrous tissue. In the young the transformation of white thrombi into connective tissue takes place quicker than in the old with degenerate arteries. In some of the former the accumulation of leucocytes at the damaged wall may be so rapid and so great as to assume the appearance of granulation tissue. When there are extensive calcareous plates in the wall of the vessel or the aneurism, the formation of white thrombi is seemingly delayed, and when formed they seldom pass into a vascularized state, owing probably to the dead calcareous matter intervening between the thrombus and the vasa-vasorum. The deposition of white thrombi occurs so slowly that, in large aneurismal sacs, it is, as a rule, many months before occlusion takes place. The thinner the layer of white thrombi formed on the wall of the vessel the easier will its organization be effected; therefore the slower the process, other things being equal, the surer will organization follow in its wake. If one could so regulate the depo-

sitions as to insure organizations of one layer before the next was superimposed it would be advantageous, in cases where no urgency exists. Even in large thrombi, however, organization takes place, and may become complete. Formative cells may be found developing in white thrombi in the lower animals a few weeks after their formation. In the course of time the connective tissue which has replaced the thrombus shrinks very considerably, so that what has been a large solid tumor quickly becomes reduced to a diminutive size. It is, therefore, seen that a thrombus formed by acting on the contents of an aneurismal sac is different from one induced by acting on its walls. The introduction of foreign bodies into the sac of an aneurism in which the blood is freely circulating, with the object of forming red thrombi, is not the most certain way of producing permanent occlusion of the vessel. White thrombi are more suitable for permanent aneurismal occlusion under such circumstances.

Granting the aim to be to secure a white thrombus in an aneurismal sac, how can this be accomplished? In an elaborate paper published in the *Lancet* for November 22, 1890, Dr. Wm. Macewen shows that this may be done by irritating the wall of the aneurism in such a way as to induce infiltration of the parietes with leucocytes, and a segregation of them from the blood-stream at the point of irritation. The irritation ought to be just sufficient to set up reparative exudation, and must not exceed this. If the irritation be pushed to such an extent as to induce softening of the vessel wall, not only would the object be frustrated, but the pressure of blood from within might cause the aneurism to burst. While it is true that once the white thrombus has been formed in the interior of an aneurism it tends to grow by successive accretions, and, by starting at a small irritated point in the wall of the distended vessel, it might ultimately cause complete occlusion. Yet it is better so to act upon the wall of the aneurism as to produce either a uniform irritation over its whole surface, or to stimulate as many points in its interior as possible. In this way many foci will throw out white thrombi; at all such places the wall of the vessel is being strengthened and preserved from further dilatation. It is well, if possible, to secure foci all over the sac for another reason: were a white thrombus formed in one part of a sac alone, it might be possible for the blood-pressure to be exerted all the more on some other part of the sac not so protected, and so in the case of a very thin wall damage might result. It would be well, therefore, to ascertain, as far as possible, the form and dimensions of the aneurismal sac before inducing plastic effusion at any one part of it. This may be readily done beforehand in aneurisms of the extremities; but in those of the trunk and root of the neck it in many cases can only be ascertained by investigation within the aneurism itself. Fortunately a very fair idea may be ascertained by the very instrument which is intended to induce the cure, and at the same time as the latter is initiated. The means hitherto employed to effect this purpose have been very simple. The instrument employed is a pin of sufficient length to completely transfix the aneurism and to permit of manipulation within it. Its calibre ought to be as fine as possible, the strength being only sufficient to penetrate the coat of the aneurism and the intervening tissues. This cylindrical pin tapers to a point, like an ordinary sewing-needle, and has on its opposite extremity a somewhat rounded head. As the coats of aneurismal sacs vary in thickness, these pins must be made of various calibres, as those which may pass readily through one aneurismal sac may not pass through others with thicker walls. They ought also to be finely polished, not only to facilitate their introduction, but to help to render them aseptic.

Before performing the operation, the skin over the aneurism ought to be carefully cleansed and rendered aseptic. The aseptic pin ought then to penetrate the sac and pass through its cavity until it comes in contact with the opposite side. It ought to touch and no more. Then one of two methods may be employed,—either to move the pin over the surface of the inner wall so as to irritate its surface, or to allow the impulse of the blood-current playing on the very thin pin to effect the same object. If the wall penetrated by the pin on introduction be dense, the former method will be preferable, as the force of the blood-current produces such a feeble action on the thin pin as to be insufficient to move it to and fro, while it is firmly grasped by the dense wall. After acting thus for ten minutes at one part, the point of the pin, without being removed from the sac, ought to be shifted to another spot, and so on until the greater portion of the internal surface opposite to the point of entrance has been touched; this ought to be done in a methodical manner. A single insertion of

the pin through the aneurismal sac into its interior may be sufficient to enable the point of the instrument to come into contact with the greater part of its internal surface, but in some cases puncture from various sides of the external wall may be necessary so as to reach portions of the tumor which cannot be attacked from the first puncture. While the pin is in the aneurism it is surrounded by a portion of aseptic gauze, or moistened with an antiseptic solution. When it is withdrawn from the aneurism, the part ought to be covered with moist antiseptic dressing, preferably a watery solution of carbolic acid, which ought to be maintained for several days. The period a pin may remain in an aneurismal sac without doing damage is perhaps dependent on the individual and the state of the aneurism, but it ought never to exceed forty-eight hours. It is questionable whether all the necessary advantages derivable from the irritation of the wall of the aneurism could not be produced within a few hours. No doubt their retention for twenty-four or thirty-six hours *seems* to produce a greater effect. If the aneurism be very large, several pins may be introduced from various points, always allowing a considerable interval to exist between each, otherwise there might be too much damage to the vessel wall at one spot. In some instances the point of the pin has been engaged in the opposite wall of the aneurism, and it has thus produced sufficient irritation. It need scarcely be said that the general health of the individual and the condition of the aneurism and of the surrounding tissues ought to be carefully examined before commencing the treatment. If there be anything wrong which could be put right before operating, that ought to be done. No one would think, for instance, of introducing pins into an aneurism that was inflamed or where the tissues in the vicinity of the aneurism were in a state of erysipelas. It would also be necessary to render aseptic any sore in other parts of the body which the patient had. When the pin has been withdrawn, though there may be a little thickening of the tissues in the neighborhood, there will probably be little or no diminution of the eccentric impulse. Occasionally it may be weeks before any distinct or tangible thickening of the coats can be made out. In other instances this may be discernible at a much earlier period. But, as a rule, a distinct thickening of the coats of the vessel is tangible at an early period. It has occasionally happened that some weeks after the first introduction of the pins, the walls, though thickened, appeared to be so only to a slight extent; whereas, when a second puncture of the sac was made, a much stouter pin was required to penetrate the coats than the one which on the first occasion slipped easily through the walls of the aneurism, showing that there was a greater thickening than was indicated by external palpation. Further, in one instance, had the amount of dense fibrous tissue within the aneurism been rightly appreciated, it is probable that a death from suffocation would not have been permitted, at least without an endeavor being made to save the individual by operative means. It is also to be borne in mind, especially in deep-seated aneurisms, that the thickening appreciable on the external surface of the sac through which a pin has passed is much less, as a rule, than that on the part of the sac acted upon by the points of the pins, and therefore the one farthest away from the point of entrance, and which cannot be reached by manipulation. Thus irritation of the coats of the aneurism has been in some of my cases many times repeated at intervals of weeks, and in one case of months, with the view of hastening the consummation of the cure. Though there was apparent advantage after each, it is doubtful whether the formation of white thrombi was not going slowly on independent of this interference. It is clear the coats of the aneurism cannot be reached by the pin after they have been covered by a thick layer of white thrombi; the extremity of the pin must, therefore, come in contact with the dead thrombi alone. Were the previous layer of thrombus vascularized, then the secondary introduction of the pin would be of service in coming into contact with living tissue, and setting up in it fresh irritation and fresh deposition of white thrombi.

In introducing pins, care ought to be taken to avoid injuring important structures which may be overlying the sac. The cords of the brachial plexus may be raised by aneurism at the root of the neck; it would be necessary, in order to prevent pain, to insert the pins apart from them. Where the aneurism is inaccessible from without, this mode of treatment could not be applied, but most of the aneurisms of the chest whose physical features can be determined, and whose limits are clearly defined, may be subjected to this form of treatment. When a sac is covered by calcareous depositions, it is possible that these may exercise a deterrent influence in the production of thoroughly-organized connective tissue

forming in the thrombus. The younger the patient, other things being equal, the quicker would the white thrombus form. Suppose complete consolidation may not be effected from the treatment, the thickening of the coats of the aneurism may prolong life, especially if it be uniform. Though this method has been adopted of producing the necessary effect upon the wall of the sac, any other mode of carrying out the principle of the treatment, the occlusion of the sac by the formation of white thrombi, and its consequent organization into living tissue, might be used, provided it showed any advantage. One would be inclined by preference to use any means which, while being equally successful and easily applied, would do away with the necessity of penetrating the sac.

Dr. Macewen reports four cases of aneurism treated by this method. The first was that of aortic aneurism, which was seen at an advanced period when death was threatened by dyspnœa, in which this method of treatment was employed, but too late to prove of value, since death occurred within a month from fatal dyspnœa.

In the second case, that of aneurism of the upper part of the right femoral, involving the external iliac artery, which measured five inches in diameter, the aneurism was completely cured by the induction of white thrombi within the sac, and a post-mortem, being possible from the patient's death fifteen months later from carcinoma of the tongue, permitted of a verification of this fact. This aneurism was entirely obliterated, its place having been taken by a reddened tissue.

The third case was that of an abdominal aorta, treated by induction of white thrombi in interior of vessel. The treatment was only persisted in for a month, from the fact that the patient at that time felt so much relieved that he determined to resume work. The tumor was not at that time entirely consolidated, but after two and a half years he was still living and comparatively well.

The fourth case was of intrathoracic aneurism, probably of the left subclavian, accompanied by great swelling, pain, numbness, and loss of power in the left arm, treated by induction of white thrombi within the sac, which resulted in complete consolidation of the aneurism and restoration of function of arm.

These cases thus show that white thrombi may be introduced by direct local action. Dr. Macewen cautions, however, in the strongest terms, against the indiscriminate employment of this treatment upon every case of large aneurism, especially upon those which are beyond hope, as only in such cases can discredit attach to its employment. The very simplicity of the treatment, the facility with which it may be carried out, without even the use of an anæsthetic, and the comparatively limited anatomical knowledge required, make this word of caution necessary. Further, where it is employed, care must be taken to have the pin entirely aseptic, for while the introduction of an antiseptic steel pin into the sac could rarely be productive of harm, disasters might readily result from the introduction of a pin carrying septic matter with it. It is well, however, that the fact is established that white thrombi may be induced simply by the direct local action, without any aid from other directions. No doubt some cases will be found more suitable for this form of treatment than others; some in which the white thrombi will form more readily and some more slowly, and possibly others in which it will not take place. Future experience will decide. I trust that this form of treatment will not be indiscriminately employed upon every case of large aneurism, especially upon those which are beyond hope, otherwise the method will be discredited. The very simplicity of the treatment, the facility with which it may be carried out, without even the use of an anæsthetic, and with a comparatively limited anatomical knowledge, make this word of caution necessary. The cases of uncomplicated aneurism must be few in which the introduction of an aseptic steel pin into its sac would be productive of harm. Disastrous results would easily follow the introduction of a pin carrying septic matter with it.

In conclusion, whether this precise method of inducing white thrombi within the sac be accepted matters little, if we accept the fact that every aneurism contains within itself a potential cure. We have only to devise methods of calling it forth.

SALINAPHTHOL.

This body is a combination of salicylic acid with naphthol, and is thus analogous to salol, which is a combination of the same acid with phenol. It has no odor, nor taste, and is insoluble in water, and is claimed to act equally well to salol in acute articular rheumatism, while it is tolerated in the dose

of 4½ to 7½ grains repeated four times daily, producing no headache nor any symptoms of poisoning. Under prolonged use Kobert believes that, as a result of the action of the pancreatic juice and the intestinal ferments, it is split up into salicylic acid in the urine.

Dr. Lépine (*Journal de Médecine de Paris*, November 16, 1890) denies that the intestinal juice is capable of producing this decomposition, though he admits that it may be produced by the pancreatic juice. He does not, however, seem certain as to whether the decomposition is not attributable simply to an alkaline reaction, as it may be produced within the blood. Nevertheless, testimony appears to show that salinaphthol is less toxic than salol, from the fact that the naphthol resulting from its decomposition is less poisonous than the phenol which results from the decomposition of salol.

As yet, however, the clinical data are insufficient to establish the therapeutic value of this medicament.

TREATMENT OF "COLDS" BY SODIUM SALICYLATE.

In a recent number of the *Memphis Medical Journal* the claim is made that salicylate of sodium is as equally efficacious in the treatment of bad colds as it is in tonsillitis. A prescription of half an ounce of salicylate of sodium with half an ounce of syrup of orange peel, and enough mint-water to make four ounces, is recommended in the dose of a dessertspoonful every three or four hours, until the specific action of the salicylate—that is, ringing in the ears—is produced. It is claimed that aching in the brow, the eyes, and the nose, together with the sneezing and the nasal discharge, will then cease, and will entirely disappear in a few days, not leaving, as is usually the case, cough from the extension of the inflammation to the bronchial tubes.

CHEMICAL ANALYSIS OF KOCH'S REMEDY FOR TUBERCULOSIS.

According to the Vienna correspondent to the *Lancet* for November 29, 1890, a small quantity of Koch's remedy provided by Professor Schnitzler has been subjected to a preliminary chemical examination at the private laboratory of Dr. Jolles, and the following results have been obtained: It is a syrupy, slightly-foaming liquid of brown color, its aqueous solutions showing a greenish fluorescence. In odor it resembles elder yeast or leaven combined with a sweet aromatic admixture such as honey. If slowly heated, the smell of yeast gives way to an agreeable odor resembling fruits; on further heating, the smell becomes like that of fresh bread-crust, but without the acid character of fruit. If the heating of the substance is continued, the smell assumes the empyreumatic character of that exhibited by burning albuminous matter and carbonizing horny substances. Only an extremely small quantity of ash (under one per cent.) was obtained. The liquid shows a neutral reaction. Some of the liquid was diluted with water and subjected to various tests. By adding diluted acetic acid it becomes slightly opaque, by which the presence of a small quantity of mucin is indicated; by further adding potassium ferrocyanide the opacity of the liquid is increased, showing the presence of albumen; but this reaction is too feeble to indicate the amount of the active principles in the lymph. On the other hand, the biuret reaction characteristic of peptones is very strongly marked. The tests for cyanogen compounds gave perfectly negative results, and the assumption that Koch has been using cyanides of gold or prussic acid seems, therefore, completely erroneous, as no metals could be detected in the liquid. Traces of reduction were observed after treating the liquid with Fehling's solution, but the presence of sugar among the reducing substances could not be confirmed. Sulphur and phosphorus in an organic form proved to be absent. As only a small quantity of the lymph could be used for chemical examination, it was impossible to shake the liquid with ether and alcohol for the purpose of separating the alkaloids, if present, from the albuminoids, but the reagents which reveal the presence of alkaloids and ptomaïnes, even when mixed with albuminoids,—*e.g.*, acid bichromate of potassium,—failed to give a reaction, so that the absence of alkaloids and ptomaïnes may be taken for granted. It seems, therefore, that, besides the peptones, the principal active substances contained in Koch's lymph belong to that not yet chemically-defined class of the protein bodies called toxalbumens, globulins, or enzymes, which play such an important *rôle* in all fermentative processes, from the chemical changes produced by common yeast in the products of the vegetable kingdom up to the coagulation of the blood in animals.

TRIALS OF KOCH'S LIQUID ABROAD, AND OPINIONS OF THE MEDICAL PRESS.

In France the reception of Professor Koch's discovery by the medical press has been fairly cordial. Some journals, as the *Gazette Médicale de Paris* and the *Progrès Médical*, are content with giving abstracts of the recently-published reports from Berlin, the last named expressing surprise at the moderate and somewhat vague terms in which the action of the remedy is now being spoken of, compared with the more enthusiastic language first held. *L'Union Médicale* (November 27, 29, and December 2) has followed carefully the progress of events. It points out that more caution is being used in its employment, especially in view of its liability to induce acute pulmonary œdema in lung tuberculosis, or œdema of the brain in meningeal cases, or of the glottis in laryngeal, etc. Surgical cases are more amenable to treatment because of the readiness with which the diseased parts can be completely extirpated after the remedy has exerted its necrotizing effect. It refers to Von Ziemssen's opinion that lung cases will require prolonged treatment. M. Villaret, writing from Berlin to the *Semaine Médicale*, insists on there being a certain idiosyncrasy in the extent to which the injections are borne, and cites three cases treated by the same doses, in one of which a typical reaction took place after fifteen hours, in a second an "atypical" one after three hours, and in the third a weak but typical reaction after ten hours. *L'Union Médicale* thinks that we are still much in the dark, and points to the fact that relapses have already occurred in lupus cases: it is an error to believe that we are at all near proofs of its real therapeutic efficacy. At the Laennec Hospital, on November 30, MM. Cornil and Chantemesse inoculated six patients, two being cases of lupus, two of early pulmonary tuberculosis, and two of surgical tubercular affections. In one of the lupus cases, a young man of 18 years, .002 c.c. was injected, and reaction began five hours after, the temperature reaching its maximum in twelve hours (39.2° C. from 37.2°). The appearances were precisely similar to those described by all who have tried the remedy in lupus. There was an equally marked reaction (maximum temperature 39.4° C.) in a case of early phthisis, with headache and nausea, and slight auscultatory changes attributed to congestion. M. Pean, on the 29th, inoculated several cases at St. Louis Hospital. He expressed the opinion that Koch was justified in withholding the nature of the remedy at present, and insisted on the danger of incautious administration. Dr. Moreau, of Algiers, asserts that in some well-marked tubercular cases no reaction has followed injection, and that in some non-tubercular subjects reaction has been observed. In one case of Leyden's the fever set up by the injections continued after these were discontinued. *La Province Médicale* (November 29) thinks that enthusiasm is giving way to uncertainty, and avers that in pulmonary cases its action is very limited, and that, although it may cause diminution in expectoration of bacilli and in night-sweats, its use is not followed by any gain in weight or strength. Much is required to be known concerning the length of time that such cases have to be treated. The *Gazette des Hôpitaux de Toulouse* defends Koch for his reticence, since he was forced to publish his results prematurely. It says that in showing that the "lymph" has an elective affinity for tubercular tissue, his researches are to be greatly praised. It raises the question as to the desirability of "curing" the phthisical. The *Allg. Wiener Med. Zeitung* (November 25) devotes much space to contributions on the subject, including one by Dr. Buchner, of Munich, who points out that inflammatory action may play the chief part in the destructive process. The *St. Petersburger Med. Wochenschr.*, No. 46, November 17 (29), states that on November 11 (23) Professor Anrep gave an address on the subject, and inoculated three lupus cases with some of the "lymph" given him by Professor Koch. Other delegates have also gone to Berlin, and many physicians from all parts of Russia. The remedy has also been used in Professor Baccelli's clinic at Rome.—*Lancet*, December 6, 1890.

AN EARLY SIGN OF UTERINE CANCER.

In a paper published by Dr. Charles Audry in the *Lyon Médicale* for November 23, 1890, it is claimed that in doubtful cases of uterine inflammation, especially when confined to the neck or cervical cavity of the uterus, and in which a diagnosis can ordinarily only be made as the result of microscopical examination of excised fragments, in every case in which fragments of tissue may be scratched off from the cervical cavity by the finger-nail the epitheliomatous nature of the disease may be positively affirmed. In

chronic metritis the tissues to the touch appear sometimes hard and sometimes soft, but in no case is it possible to scratch off fragments of the mucous coat by means of the finger-nail, with the single exception of cancer. Further, the author claims that there is no form of epithelioma in this cavity from which fragments may not be so removed. This process is evidently simple, and, if confirmed by others, will be of great value in clinical practice.

PHYSIOLOGICAL ACTION OF THIALDINE.

Thialdine, obtained for the first time by Woehler and Liebig, in the form of large crystals, of aromatic odor, which volatilize at the ordinary temperature without decomposing, is but slightly soluble in water, dissolves rapidly in alcohol and acids. According to *Les Nouveaux Remèdes* for November 8, 1890, from experiments made with this substance the following conclusions were reached :

1. Thialdine is very poisonous in frogs in the dose of ⅓ grain for every one hundred and fifty grains body-weight, though much less poisonous in rabbits.

2. Its administration is followed in the frog by profound sleep, with loss of general and reflex sensibility, depressed sensibility of the motor nerves, while the muscular irritability remains intact. In the rabbit the anæsthesia is less intense, and interrupted by excitation.

3. Thialdine invariably causes slowing of the pulsations of the heart, which, nevertheless remain perfectly regular. It is only when given in very large doses, and then only immediately before death, that the pulsations of the heart become irregular.

4. When given in small doses, the slowing of the pulse is only transient. Injected in small doses in the excised heart, thialdine diminishes the number of pulsations, at first prolonging the diastole, after rendering the contractions of the heart irregular and more rapid, and finally arresting the heart in diastole.

5. In large doses it slows at the outset cardiac contractions, and then leads to the arrest of the heart in diastole.

It would thus seem that carbothialdine and thialdine differ absolutely from each other as regards their physiological action. The first is an energetic tetanizer, and never produces irregularity of the heart, which it arrests in diastole. On the other hand, thialdine produces irregularity of the heart, which, in the majority of cases, it arrests in systole ; finally, while carbothialdine produces no effect on rabbits, thialdine is poisonous in them, though to a less degree than in frogs.

THE PHYSIOLOGICAL ACTION OF SULPHALDEHYDE.

Sulphaldehyde, produced by the action of sulphuretted hydrogen on ethylic aldehyde, occurs in the form of an oleaginous liquid of a repulsive odor, solidifying slightly below the freezing-point. Treated by acids, sulphaldehyde is transformed into a solid, the point of fusion of the various articles of commerce varying in accordance with their greater or less purity. Its analogy in composition to paraldehyde led Dr. Lusini to test the physiological action of the sulphaldehyde, administering it by injections intraperitoneally, and into the stomach of rabbits and frogs (*Les Nouveaux Remèdes*, November 8, 1890).

It appears that sulphaldehyde produces profound and tranquil sleep without any phenomena of excitation. On account of its insolubility, some time is required before its effects follow its administration ; nevertheless, it is claimed to be much more energetic than paraldehyde. It is eliminated completely by the urine, to which it gives its characteristic odor.

PRACTICAL HINTS ON STERILIZING MILK.

At the meeting of the New York Academy of Medicine, held November 13, 1890, Dr. Walter Mendelson read a paper, which contained many practical hints of value on the different processes of sterilizing milk (*New York Medical Journal*, December 13, 1890). He said that much of the confusion and dissatisfaction of the laity in preparing sterilized milk was due to the fact that the theoretical principles upon which they must work had never been simply and fully explained to them. He thought that it was not only the physician's duty to let the one upon whom the preparation devolved know the means, but the object as well. Explain to her or him that investigation had shown that not only were the curdling, souring, and other obvious changes due to the growth of bacteria or minute germs in the milk, but also that various dyspeptic and diarrhœal

diseases of bottle-fed children were caused by the presence in the milk of similar minute organisms which might produce no change in the milk itself. Tell them that it had been found that, when milk had been heated to the boiling-point, and kept there for some time, both the plants and their seeds were killed and the milk was thus rendered fit for food. After having explained that the object was to prepare a food free from germs, the next thing was to show how to accomplish this. The milk, or suitable mixture of milk, water, cream, and sugar, should be prepared as early in the morning as possible, before the heat of the day had caused the bacteria to multiply. Great care must be taken in cleansing the bottles and nipples, and for this purpose "pearline" seemed to answer the best, using it with hot water and a bottle-brush. The same bottle should never be used the second time without washing. With regard to stoppers, the best consisted of a plug made of ordinary cotton batting, folded into a pretty firm wad, and pushed down for half an inch or more into the neck of the bottle. The nipple should be a plain, conical, pure gum one, with no constrictions in it, so that it could readily be turned inside out for cleansing. When not in use it should be scrubbed clean and placed in a glass of water to which a teaspoonful of borax had been added. As for the sterilizer, any apparatus would do that would answer the purpose of keeping the milk for about an hour at the temperature of boiling. But of the specially devised affairs for this purpose, "Arnold's steam sterilizer" was the most ingenious and at the same time simple. The sterilizing of milk had marked a great advance in our methods of infant-feeding, and, as the triumphs of medicine in the future would seem to lie in the direction of preventing illness rather than of curing it, it should be the pride and interest of every physician to popularize the method under discussion, for it had already done much to lessen the morbidity and mortality among infants.

THE NATURE OF DR. KOCH'S LIQUID.

We may reasonably expect that within a very short time the profession will be placed in possession of such details concerning the nature of the material discovered by Professor Koch to have so powerful an effect upon tubercular tissues as may set at rest the "secret remedy" question. This at least may be gathered from the important statement made on the 29th ult. by Herr von Gossler in the Lower House of the Prussian Diet. It has seemed to us no compliment to Professor Koch to regard the result of his scientific investigations in the same light as other so-called "cures" and quack remedies, but at the same time we have felt that there could be no possible harm accrue from such an exposition of his researches as might satisfy the most delicate scruples. Nay, we believe that no difficulties will be placed in the way of competent bacteriologists being instructed in the methods in Professor Koch's laboratory. What, however, is essential, in the interest of medical science and of the tubercular patients themselves, is that the material, wherever made, should be thoroughly tested as to its reliability before being placed in the hands of practitioners. A fortnight since we ventured to suggest as a feasible plan to meet this requirement, that each specimen of liquid wherever prepared should be certified by a central and responsible authority. The Prussian minister hinted that the state would undertake this responsibility, in the following declaration. He said, "A feeling of satisfaction will be experienced throughout the world if Prussia sets her stamp upon the lymph, but a guarantee must be given that there is no question of financial or other subsidiary considerations. The government would eventually invite other nations to send representatives to study the remedy and make it known in their respective countries." We can endorse this satisfaction, and accept the assurance that nothing of a commercial speculation will be made of the remedy. That five grammes of the fluid, sufficient for five thousand injections, should cost twenty-five marks is not surprising, and, indeed, it shows that it is, *quo ad* its alleged effects, perhaps the cheapest drug ever placed in the market. It is noteworthy that secret remedies are nowhere so sternly discountenanced as in Prussia. Moreover, we learn that on the left bank of the Rhine, where the Code Napoléon is still in force, it is absolutely illegal to use any remedy the composition of which is unknown, and even a newspaper writing in favor of it is liable to a fine. Finally, we would call attention to the subjoined statement made by the Vienna correspondent of *The Times* of the 3d inst.:

"The Vienna Board of Health has passed the following resolutions: The inoculation of out-patients with Dr. Koch's lymph is not to be permitted for the present. Every case of

inoculation is to be notified to the authorities, and both physician and patient are to be closely watched. The origin of the lymph must be exactly described in each instance. An order from the Minister of the Interior, based on these resolutions, will be immediately published."

The need for such stringent surveillance is, we regret to learn, due to the doubtful character of the practice which has arisen in that city. Apart from this, the highly dangerous nature of the remedy must necessitate the greatest caution in its employment. —*Lancet*, December 6, 1890.

CHRONIC CONSTIPATION.

According to the *Medical Press and Circular* for November 12, 1890, at the meeting of the Berlin Medical Society, HERR FLATAU introduced a new method of treating cases of chronic constipation due to torpor of the colon. This consists in applying about 3 grammes of boric acid. In those cases in which the lower edge of the rectum protrudes through the anus, and when this remains visible after powerful contractions of the levator ani and sphincters, the quantity of boric acid mentioned is either to be dusted on or rubbed on the mucous membrane in sight. In cases in which the mucous membrane is not visible it must be insufflated. It is important that the medical attendant should carry out the procedure himself, at any rate, at the commencement. The patient should then keep quiet for a time. In from an hour to three hours peristaltic action will be observed in the colon. He has never seen a failure from this method of treatment, nor had he seen a case where the patient got so accustomed to it that it ceased to be effective. On the contrary, if carried out systematically daily, permanent improvement in time takes place, and normal peristalsis is returned to. He had tried a number of other substances, but none had the same useful effect.

THE RELATION OF ASTHMA TO OTHER DISEASES.

At the meeting of the Medical Society of London, held November 10, 1890, DR. S. WEST read a paper upon "The Relation of Asthma to other Diseases," of which the following is a brief abstract (*Lancet*, November 22, 1890): The author intended his communication rather as a review of the subject, to serve as an introduction to discussion, than as a statement of his own views. He used the term "asthma" in the strictest sense of the word, and he gave a full definition of it, which was practically a short description of the disease. He then discussed its relation to various other lesions. He held that asthma stood in no relation to affections of the lungs, other than to emphysema and chronic bronchitis. He pointed out that it usually disappeared in patients who became affected with phthisis, and related two cases in illustration of this. With regard to affections of the heart, dyspnœa was often seen in connection with them, and paroxysms were not rare, but these cases of paroxysmal hurry differed entirely from true asthmatic paroxysms. True cardiac asthma was extremely rare and was most difficult to treat; it had no connection with angina pectoris. Referring to the relation of asthma to diseases of the stomach, he held that the cause of the asthma was not due to irritation of the gastric mucous membrane itself, but to the absorption and circulation in the blood of some product of an irritant nature. Cases of so-called "asthma verminosum" probably were similarly explicable. Dyspnœa was common in affections of the kidney, but true asthma was very rare. In uræmic conditions, respiratory disturbances were common, but they more nearly resembled those seen in diabetic dyspnœa. Illustrations of the occurrence of asthma in association with gout and lead-poisoning were then given. The connection of asthma with certain affections of the nose was first established in 1872, and it seemed to be proved that reflex neuroses sometimes arose in connection with such lesions as polypus, chronic rhinitis, paroxysmal sneezing, etc. The subject had been approached in two ways,—a series of cases of asthma having been taken and the occurrence of nasal affection noted, and then a series of nasal affections in which asthma had been present. The result of analysis of these groups showed that there was some slight connection between the two, but that it was by no means constant. In some cases, however, the connection seemed exceptionally strong, instances being quoted where the growth of nasal polypi was associated with the onset of asthma, which latter disappeared upon the removal of the growths. He regarded hay-asthma as a variety of the true affection, and he pointed out that the association of asthma with pharyngeal disease was very rare. Many affections of the neck and mediastinum were met with in which

asthma occurred, but it was impossible to dissociate here the effects of pressure. A great deal had been written as to the association of asthma with diseases of the skin, but it appeared on the whole that this was only accidental, or both, perhaps, were the joint effects of a common cause. Urticaria was most frequent, then eczema, herpes, some of the exanthemata, psoriasis, syphilis, drug eruptions, acne, etc. He thought that a sufficient number of cases of asthma in association with cerebral affections had been recorded to make it more than a coincidence. It had been observed, though rarely, to alternate with insanity and with hysteria. The exciting causes were very many; for, like epilepsy, it appeared to depend on an unstable condition of the nerve-centres, and explosions could, therefore, be excited reflexly by a number of causes. He adopted the hypothesis that there was an asthma centre in the medulla, which could be acted on from above by emotion, various psychoses, epilepsy, and some cerebral lesions; in the centre itself by uræmia and dyspepsia; from below, by disturbance of the special senses, such as of the olfactory and optic nerves, by stimulation of the nerves of common sensation, as of the fifth in the face, and by cutaneous irritant rashes. It could be acted on also by the branches of the pneumogastric distributed to the neck, thorax, heart, lungs, and stomach, and by the sympathetic through its branches from the intestines, kidney, and uterus. It affected many sets of muscles other than those proper to the bronchi, and therefore could only be of central origin. In conclusion, he regarded asthma as a reflex neurosis, producing spasm of the bronchi and of the diaphragm, associated with bronchial vasomotor disturbance, and an unstable condition of the respiratory centre. It so closely resembled epilepsy that Hughlings Jackson had defined it as a "respiratory convulsion."

TREATMENT OF ENURESIS.

Dr. Kupke, of Posen, in a paper published in the *Allgemeine Medicinische Central-Zeitung*, gives his views on the treatment of incontinence of urine (*Lancet*, November 22, 1890). He considers the cause to be either diminished activity of the vesico-spinal centre in the lumbar part of the cord, or partial anæsthesia of the sensory nerves of the bladder, both of these conditions preventing prompt information being conveyed to the cortex of the cerebrum when the bladder is becoming full. In cases where deep sleep occasions the brain to lose control over the bladder, it is well to keep a light burning in the room, so as to lessen the depth of the sleep. After calling attention to a number of well-recognized causes of enuresis, such as phimosis, intestinal worms, etc., Dr. Kupke mentions Guyon's and Unverricht's methods of galvanizing the parts, the former, by means of a urethral electrode, the latter by means of a large stationary positive electrode applied to the lumbar region and a small negative electrode moved from place to place over the pubes. He himself, however, prefers faradization, combined with medicinal treatment. The former is applied by means of a large, flat, stationary, positive electrode over the last dorsal and first lumbar vertebræ, while a small positive electrode is applied with stroking movements over the region of the bladder. The most valuable drug is one which is but little known in this country,—the sweet sumach (*Rhus aromatica*). The preparation he employs is the extractum fluidum rhois aromaticæ, of which from 5 to 15 drops are given night and morning in a little milk, according to the age of the child. Treatment must in many cases be persevered in for three or four months in order to obtain a lasting cure. The well-known regimen as to fluids at night, a hard mattress, baths, etc., must of course be attended to. Strychnine, which used to be given before *Rhus aromatica* was adopted, is best administered hypodermically,—1 milligramme of the nitrate daily. Tincture of nux vomica is unsuitable.

THE ABSORPTION OF DRUGS IN THE FORM OF OINTMENTS.

According to some researches by Luff, published in the *Répertoire de Pharmacie*, certain drugs used in the form of ointments are most readily absorbed when the excipient is vaseline. Lanolin, he shows, would be the best excipient when a local action of a drug is more especially required, on account of the non-absorption which takes place. The experiments were made with iodide of potassium, carbolic acid, and resorcin, mixed with vaseline, lard, or lanolin; the mixture, contained in a sheep's bladder, was placed in a vessel of water, which was maintained at an equable temperature of 36.6°. The water was examined at short intervals in order to test the presence of the drugs. The exosmosis began in the case of the iodide of potas-

sium with vaseline after one hour, with lard after nine hours; in the case of the carbolic acid with vaseline after two hours and a half, with lard after seven hours; in the case of the resorcin with vaseline after ten hours, with lard after fifteen hours. No exosmosis took place in the case of either of the reagents where lanolin was used,—within a period of twenty-four hours.—*Medical Press and Circular*, December 10, 1890.

THE LOCAL TREATMENT OF ENLARGED SPLEEN.

Mosler contributes an article on this subject in the *Wiener Medizinische Wochenschrift*, 1890, vol. i. p. 3. He commences by drawing attention to the dangers of operative interference in cases of enlarged spleen, and states as the results of his experience that the hemorrhagic diathesis is often associated with an enlarged spleen, which naturally renders the operation of extraction an exceedingly dangerous one, and what adds considerably to the risk is that the tendency to hemorrhage often remains latent in such cases. In addition to this danger, there is another more probable and serious one,—namely, that the lymphatic glands on other parts of the body may already be affected, in which case splenotomy may only hasten the general disease. Mosler has, therefore, for some time tried other local remedies rather than extirpation. He first used parenchymatous injections of a two per cent. solution of carbolic acid, and later injections of Fowler's solution. With the latter he obtained good results in a patient with an enlarged spleen, the result of malarial fever. Mosler also employed Hamond's method of injection of ergot, and also Jager's processes,—simple puncture, electro-puncture, and injections of sclerotic acid. In Jager's case death followed a few hours after the injections of the sclerotic acid. In spite of fourteen punctures and four electro-punctures, no trace of hemorrhage was found in the parenchyma of the spleen. One fatal case which Mosler had caused him to frame the following rules for the injection of drugs: 1. Only enlarged spleens of firm consistence are suitable, provided these are not accompanied by an extreme degree of anæmia, or by evidences of the hemorrhagic diathesis. 2. Before the injections a prolonged use of drugs is necessary (these drugs are not mentioned by name), in order to act upon the contractile elements of the spleen, and so diminish the amount of blood in the organ, and, as far as possible, to render narrower the lumen of the vessels; the application of an ice-bag over the spleen is especially useful a few hours after and before the injection. 3. Fowler's solution is the most satisfactory drug to inject. Mosler states that he has recently had very good results following on the injections in enlarged leucæmic spleens. In one or two cases in which the disease proved fatal there was shown to be considerable thickening and constriction of the capsule, and Mosler is of opinion that this contraction has a favorable result not only by producing a general lessening in size of the spleen, but also by checking the leucæmic process, thus considerably improving the prognosis.—*Lancet*, November 8, 1890.

THE CHOLAGOGUE ACTION OF OLIVE OIL COMPARED WITH THE ACTION OF OTHER CHOLAGOGUES.

S. Rosenberg has performed a series of physiological experiments upon dogs with gall-bladder fistulæ, with the view of determining the conditions necessary to the secretion of bile under various general circumstances. He finds it noteworthy that the animals emaciate considerably in the early stage of the experiment,—*i.e.*, immediately after establishment of the fistula,—and that rolling and gurgling in the intestine, discharge of offensive flatus, and other symptoms, all of which are well known to appear in connection with fistulæ, at once supervened; but that after lapse of some time they fared well on a diet of rice and horse flesh.

The first experiments endeavored to demonstrate the secretion of bile in starvation and during digestion. After a twenty-four-hour fast the amount of bile, both the solid and fluid constituents, increases at those periods of the day which correspond to meal-times or the hours of taking cholagogue substances; at other periods it diminishes. Stimulated by the presence of food, the secretion of bile increases greatly; already during the first hour of the digestion process it is pronounced, while in the second hour it reaches the maximum; at this stage its consistence is less.

Rosenberg furthermore determined the cholagogue action of olive oil, sodium salicylate, Durand's mixture (ol. terebinth., p. i; sulphuric ether, pp. iii), plain water, and the artificial Carlsbad salts.

Olive oil is a powerful cholagogue when

given in large doses; sodium salicylate has the same property but to a much less degree; large quantities of water, either by the mouth or injected into the rectum, cause a temporary rapidly evanescent biliary increase. Durand's mixture of the above formula is not proven to be a cholagogue, though ol. terebinth. alone is. Carlsbad salts, whether taken in concentrated or dilute solution, lessens the physiological action of the liver.—*Pittsburg Medical Review*, November, 1890.

MANIPULATION OF THE NASAL MUCOUS MEMBRANE.

Dr. von Cederschiöld has for some years employed a kind of manipulation, which he considers is of the nature of massage, in various affections of the nasal and pharyngeal mucous membrane. He first tried this kind of treatment on himself while suffering from chronic pharyngeal catarrh following diphtheria, and since then has had opportunities of using it on about a hundred cases in Stockholm. The instrument for the nares consists of a double spiral of silver wire about five inches in length, provided with a small wooden handle at one end and a loop or eye at the other. This loop serves to fasten one end of a strip of batiste,—a material of which infant's frocks are made,—which is wound round the spiral so as to cover it completely before the process is commenced. The instrument is gently introduced into the nostril, and moved to and fro. For the pharynx a sponge-holder is used, carrying a pledget of cotton-wool, which, as well as the metal parts, is carefully covered over with batiste. Gentle but rapid friction movements are made with this over the mucous membrane of the pharynx or naso-pharyngeal space. Not content with manipulating these regions, Dr. von Cederschiöld has actually invaded the interior of the Eustachian tube. For this purpose he employs a spiral similar to that used for the nares, but much finer,—fine enough, that is to say, to be introduced into the tube through an ordinary Eustachian catheter.—*Lancet*, November 15, 1890.

THE EMPYREUMATIC TINCTURE OF NICOTINE IN DIPHTHERIA.

Struck by the coincidence that inveterate users of tobacco seem to be especially exempt from infectious diseases, Dr. Schwitzer (*Centralblatt für die Gesammte Therape*, December, 1890) was led to test the effects of the preparation obtained from tobacco in the treatment of diphtheria, and he claims that his results have been sufficiently favorable and satisfactory to deserve notice. The fluid that he used was prepared from the tobacco residue remaining in pipes after ashes had been removed, and which was so moist as to be incapable of burning, or, still better, the empyreumatic oily substance which after prolonged use collects within the interior of pipe-stems; 2 to 2½ parts of this substance were digested in 35 to 40 parts of alcohol and then, after standing twenty-four hours, filtered, the filtrate being clear and reddish-brown in color.

Dr. Schwitzer writes that he has employed this tincture for the last eight months in 60 cases of diphtheria in children as a local application by means of a camel's-hair pencil to the throat, and the results, he claims, are so satisfactory that he was only in rare instances compelled to use any internal remedy; that shortly after painting the throat the fever was greatly reduced. The applications are not painful, and no symptoms of poisoning from the remedy were ever observed. Of the 60 cases so treated, 7 died, of which, 3 deaths were attributable to complications. As an accessory he employs a gargle made up of infusion of tobacco-leaves 2 parts to 200 of water.

Reviews.

Atlas of Venereal and Skin-Diseases. By Prince A. Morrow, A.M., M.D., Clinical Professor of Venereal Diseases in the University of the City of New York, etc.

New York: William Wood & Co., 1889.

Of the last two fasciculi now before us, Part XIV. contains five plates, presenting ten illustrations,—lupus erythematosus, lupus vulgaris, lupus papillaris, tuberculosis, papillomatosa cutis, sarcoma of the trunk, sarcoma of the face, epithelioma, rodent ulcer, macular and tubercular leprosy. Of these, all of which, with one or two exceptions, are faithful representations, special mention may be made of the illustrations of leprosy, lupus vulgaris, sarcoma, and rodent ulcer. It seems to be difficult, judging by the example in this and other atlases, to present a clean cut picture of lupus erythematosus, and yet, clinically, the disease is usually well defined and with positive characteristics. Part XV. presents illustrations of scabies, pediculosis cor-

poris, chromophytosis, trichophytosis, eczema marginatum, and favus. The picture of scabies, while not an uncommon clinical picture, is not the most usual one, and a better plate could have been selected. On the contrary, the representation of pediculosis corporis is admirable. The same good opinion may be expressed as to the illustration of eczema marginatum.

These two numbers, we believe, complete the atlas. Briefly reviewing the work as a whole, it gives us pleasure to say that the first favorable impression made by an inspection of the earliest fasciculi has been maintained and strengthened as the new parts have appeared. A publication of this kind, monumental in its labor as it is, will, almost of necessity, contain several illustrations which are below the average merit, both as to selection and execution, and this work is not an exception in this respect. In considering, however, that Dr. Morrow has presented or brought together from one to two hundred pictorial illustrations of cutaneous diseases, it may be truthfully stated that, taken in its entirety, the selections and representations have been well made, reflecting great credit upon the distinguished author. To those, therefore, whose clinical opportunities are somewhat limited, this atlas, with its accompanying brief and clearly-written text, may be safely and cordially commended.

SEVENTEENTH ANNUAL REPORT OF THE MATERNITY HOSPITAL, 734 South Tenth Street, Philadelphia, 1890.
Press of Patterson & White.

We no longer believe in punishing the unborn or new-born infant for its mother's follies and frailties. We are gradually getting to the point where we no longer consider it immoral to provide a lying-in place for unmarried mothers; no longer feel that we are accessories after the fact if we render them some assistance, afford them temporary shelter. This moral point being disposed of, it is to be hoped that many readers will read, and reading, take to heart and favor and encourage the efforts of the Maternity. When we consider the work it has done and the excellent way it has done it, the low mortality in a class of births of proverbial high mortality, we only feel regret that its means are not larger and that its field of work is curtailed by pecuniary necessity. Since the opening of the hospital fifteen hundred and five confinements have taken place there, with a percentage of deaths from septic causes of .73; from all causes, 1.32; but during the last few years of antiseptics the percentage is, with a greatly increased number of inmates, .34, which is a gratifying and excellent result under the circumstances. E. W. W.

HAND-BOOK TO DR. KOCH'S TREATMENT IN TUBERCULAR DISEASE. By Edward F. Grün, M.R.C.S., L.R.C.P., and Walter D. Severn, A.R.C.S.
Published by G. A. Churchill, New Burlington Street, London.

At a time when the whole world is excited and expectant in regard to the recent discovery of Dr. Koch, anything bearing upon the topic is eagerly sought. The Hand-Book, the authors tell us, was issued in four days after their return from Berlin, and was designed to provide the earliest authentic intelligence to anxious readers. The authors seem to have enjoyed excellent opportunities of study in Berlin, and to have made good use of them. They give, first, a rapid account of the bacilli, then a very short, plain, and useful description of the methods in use of staining these in examining for bacilli, also the method of making cultures, and Professor Koch's four postulates, which must be fairly met before the proof is complete "that any green parasite is the cause of a disease."

The lymph is described, but its origin is to the authors actually unknown. They feel sure that it is not an attenuation, but would suggest that "this treatment depends for its principle on the fact that the bacillus, like others, is killed by an excess of its own poisonous excreta, which bacterial excreta are called 'ptomaïnes.'"

The amount of the dose as actually administered is described, and the reason of its minuteness. The syringe in use is also given, though we could wish that, in the absence of plates, this discription had been somewhat clearer in some points. The chosen location for the injections, their frequency, in fact the whole technique, is thoroughly and practically given us, so that any man of medical education and moderate ability can safely perform them, if he can obtain the lymph.

The remainder of the book is composed of records of cases with remarks. This is, so far as we have seen, the best guide to a thorough understanding of Koch's method, and until something better arrives should be read by all. E. W. W.

Correspondence.

PARIS.

(From our Special Correspondent.)

Koch's Remedy in France—Uralium as a Hypnotic—Cocoa-Nut Oil for Tapeworm—Carbon Bisulphide in Phthisis—Therapeutic Uses of Retinol—Academy of Medicine Prizes.

The first death in France from Koch's lymph took place December 12 in the Saint-Louis Hospital, Paris. It is true the patient was in a most precarious condition when inoculated, and perhaps the dose ill-adjusted to the case, yet there is no doubt that Koch's cure killed him. Other like accidents will surely occur here as they have elsewhere, and then the inevitable reaction will set in. It has been the fortune of nearly all important discoveries to be first lauded to the skies, and afterwards unjustly depreciated, before their true value secured general recognition, and the probabilities are that Koch's lymph will prove no exception to the rule. If so, we may hope some relief from our present surfeit of the tuberculosis cure. The worst is that daily papers, always in quest of sensations, have been publishing ill-digested articles, reports, and interviews on Koch's discovery. For over a week it has been Koch for breakfast, Koch for lunch, and Koch for dinner; in fact, "*toujours du Koch*," till we are heartily sick of it. On the other hand, the medical and scientific side of the question remains in *statu quo*. All agree that, at all events, the discovery is a most important one scientifically, but that a year at least must pass before its curative and therapeutic value can be ascertained. On the whole, the medical profession are favorably disposed towards the new method, and mean to give it a fair trial. But there is one point—that is, the secret character of the remedy—which all agree to condemn, and with all the more reason that there are illustrious precedents to go by. For instance, when Jenner discovered cow-pox vaccination, he did not make a patent medicine of it, but generously published his process for the benefit of mankind. And now, recently, when Pasteur found the charbon vaccination, he not only published his method, but would supply the liquid to all for a nominal sum, barely covering the price of the glass. He acted likewise with the chicken-cholera cure; and, as regards his hydrophobia treatment, he not only published at once his process, but has kept on inoculating all gratuitously, and instructing all physicians in the mode of preparing and using the virus. Koch's secrecy, and five or six dollars a five-gramme vial, hardly look well in comparison. And yet people here do not find fault with him personally. They seem to think he is compelled to obey superior orders, and the public blame and slightly ridicule the Prussian government for going into the patent medicine business.

By the way, in the last number of the THERAPEUTIC GAZETTE allusion was made in this correspondence to the congratulatory telegram sent by Pasteur to Dr. Koch. As you probably know by this time, Dr. Koch wrote in reply a very complimentary letter of thanks, accompanied with two vials of his lymph, which he presented to his French brother scientist for experimenting. The specimens were thankfully acknowledged, but tuberculosis not being one of the affections treated at the Pasteur Institute, the lymph was turned over to the *Assistance Publique*,—that is, the Paris Hospital Board,—to be handed to such physicians as have tuberculous patients in their service.

Uralium, also called ural and chloral-urethan, one of the many hypnotics recently introduced, has, so far, never been used much in France. Owing to rather favorable reports from foreign sources, Drs. Schmitt and P. Parisot have undertaken a thorough investigation on the real therapeutic value of uralium. To begin with, the insolubility of the chemical is a disadvantage. Its only practical solvent, fifty per cent. alcohol dissolves it so sparingly that 30 to 50 grammes (8 to 13 drachms) of it will not take up much more than 2½ grammes (38 grains). This dose of uralium was in consequence the maximum one administered to avoid the direct effect of alcohol. Among the patients suffering from habitual insomnia, different morbid types were selected, such as epileptic and senile dementia; hypochondria, syphilitic hemiplegia, aortic deficiency, chronic bronchitis, phthisis, and psoriasis. The following were the results observed. No real soporific effect was obtained with doses less than 1 gramme (15 grains), but even with that or higher doses an hypnotic effect is not always certain. Sleep, when obtained, will not begin sooner than one hour, and occasionally three or four hours, after administration. There will be, first, an average period of two hours' sleep, followed sometimes by a second and a third resting period, sometimes

by complete insomnia. The sleep is not deep, as the slightest noise, cough, or pain will trouble it. It is quiet enough, as a rule, except perhaps with restless insane. On awaking, the patient will recover at once full clearness of mind. It only happened twice that a tendency to sleep was observed during the day; slight vertigo was also occasionally noticed. On the other hand, uralium was found to have no action, favorable or otherwise, on circulation or on the urinary secretion. With the digestive functions, however, the case is different. The medicine has so unpleasant a taste that it is with difficulty taken by most patients. Sometimes it will occasion vomiting soon after it has been administered, and in dyspeptic patients a nauseous state, lasting for several days; it may also cause loss of appetite, gastralgia, and intestinal disturbances. Now, to compare uralium with other hypnotics, its inferiority will become apparent. It was noticed, for instance, that when chloral failed with some patients, uralium failed equally with the same. But, after 2½-gramme doses of uralium had failed, the same dose of chloral was often sure to bring rest and sleep. Opium and its preparations proved also better as hypnotics and soporifics than uralium, and, besides, are much easier to administer. To recapitulate: Drs. Schmitt and P. Parisot give it as their conclusions that uralium possesses real but inconstant hypnotic properties; the sleep induced is quiet, but light and interrupted; the medicine is not well borne by patients; it readily occasions digestive troubles; and, finally, as a soporific, it is inferior to both chloral and opium.

Now, to turn from the complicated coal-tar derivatives to nature's simple remedies, Dr. Parisi, of Athens, Greece, has communicated to the French medical papers his experience with cocoa-nut oil as a tapeworm remedy. As he was travelling in Abyssinia, one day, after eating and drinking the pulp and milk of several cocoa-nuts, he felt quite sick. Soon he had a passage, and was astonished to notice he had expelled a complete tapeworm, head and all, quite dead. On his return to Athens he repeated the experiment on a number of patients, and was successful in all cases; the tænia always coming out entire and dead. The treatment he has adopted as most convenient is as follows: The patient, while fasting, is to take in the morning the milk and pulp of one cocoa-nut. No cathartic is needed, and no particular care necessary. This simple remedy is as efficient as pomegranate-root or male fern, and, for several reasons, preferable to them.

It is also to a Greek physician that we are indebted for a new remedy against phthisis, and, like the preceding, communicated to the French papers. It may not be amiss to explain that many Greek young men are in the habit of coming to France to finish their medical education, and, as they easily acquire the language, they afterwards send their most important papers to French publications to profit by their wider circulation. Well, Dr. Coromilas, of Kalamata, Greece, in 1889, while in France, published his first observations on the effects of carbon bisulphide inhalations in phthisis. Since his return to his own country he has continued the experiments, which, by the way, are based on the fact that carbon bisulphide vapors he noticed to be deadly to Koch's bacillus. In sixteen months, sixty-one cases were treated by the inhalations, combined with calcium phosphate, administered in the usual way. The results have been thirty-nine radically cured, four cured after a second treatment; twelve felt so much improved that they went home, thinking themselves cured; and, lastly, ten, the worst cases, died. The treatment was employed with equal success by other Greek physicians, and notably by Dr. Economopoulo, who thus saved his own brother, aged over 50, who hitherto failed to derive any benefit from all other medicines.

The therapeutic value of retinol has been the subject of an interesting communication made by Mr. Ferdinand Vigier to the Society of Practical Medicine. Retinol, or purified oil of resin, is obtained by the dry distillation of resin. It is a yellowish, oily liquid, of specific gravity .900, with a faint resinous odor and slightly acid reaction, which is used in the arts; but, owing to its antiseptic and solvent properties, deserves to be employed in therapeutics. Its advantages in pharmacy will readily be perceived from the fact that it dissolves ten per cent. of salol, two of naphthol, five of camphor, three of cocaine, and two and a half per cent. of chrysophanic acid, codeine, and strychnine. Besides, it is miscible with oil of cade, carbolic acid, oil of turpentine, alcohol, and ether, as well as with vaseline and most fatty substances and oils. If we add that it does not irritate the skin, is unaltered by light, not liable to become rancid, and, lastly, that it is inexpensive, an idea will be formed of the variety and scope of the uses of retinol in therapeutics. As an excipient, it will be found most

convenient for exhibiting more potent antiseptics. But without any addition, it has proved to be efficient in various affections, such as blennorrhagia and vaginitis. There it acts painlessly as an antiseptic and lubricant. In skin-diseases it has also been used with success, both when employed alone and when taken as a mild antiseptic vehicle for other preparations.

On December 16 the French Academy of Medicine held its annual meeting for the customary distribution of prizes, and the reading of the new subjects proposed for the future awards within the gift of the Academy. On this occasion ladies are admitted to the floor, and invade, without mercy, the best seats and desks. It is a sight to see bright faces and fashionable bonnets in places usually occupied by sober-looking men with bald pates, while the older gentlemen wander aimlessly, slightly annoyed at being disturbed, but well pleased with the more entertaining company. This year the learned Academy distributed some nine thousand dollars among fifty prizemen; also nine gold medals, four vermeil, one hundred and thirty-nine silver, and thirty-two bronze medals. Twelve candidates, besides, were honorably mentioned for their efforts. And yet quite a number of prizes were not awarded this year because there was either no one competing for the awards or none deserving them. Among the unclaimed prizes, one deserves mention,—namely, the Saint-Paul, of five thousand dollars, offered for the discovery of diphtheria cure; only the accrued interest—five hundred dollars—was granted as an encouragement for valuable investigations.

PARIS, FRANCE, December 19, 1890.

ARE DIGITALIS AND OPIUM ANTAGONISTIC?

To the Editor of the THERAPEUTIC GAZETTE:

DEAR SIR:—This query was presented to my mind by the following case:

Mr. P., a young white man, was found, about 5 P.M., unconscious in the cellar of his place of business. A bottle was found near him, which contained a few drops of a dark fluid, which smelled and tasted like tincture of digitalis. I was told that his family physician had prescribed tincture of digitalis for attacks of angina pectoris, from which he suffered.

His face was flushed and covered with perspiration; pupils dilated; pulse 112, but soon fell to 96; temperature 100.8° in axilla; respiration was noted, as it appeared normal. His stomach was emptied and washed out with a stomach-pump. A hypodermic injection of $\frac{1}{4}$ grain of morphine and $\frac{1}{150}$ grain of atropine was then administered. An hour and a half later he regained consciousness sufficiently to answer questions, though in rather a dazed manner. I saw him again three hours later. He was then perfectly conscious, and told me that he had become despondent on account of the attacks of angina pectoris, and had tried to commit suicide by taking half an ounce of laudanum and one ounce of tincture of digitalis shortly after 3 P.M.

Although I do not claim from this single case that digitalis is antagonistic to opium, yet the history of the case would indicate that it was so; for although he had taken half an ounce of laudanum, and I had given him quarter of a grain of morphine hypodermically, he showed no symptoms of opium narcosis, and aroused from his stupor while the room was perfectly quiet, four hours after taking the laudanum, and one and a half hours after I gave the injection, and remained awake for five or six hours. He then became drowsy, and slept a good deal during the next two days. He complained of dizziness and a dull pain in the region of his heart for several days.

I find only one case of opium-poisoning reported in which digitalis was used. In that case two and a half drachms of tincture of digitalis, in divided doses, was given hypodermically to stimulate a weak action of the heart. The patient recovered. I also found a case of digitalis-poisoning, reported by Dr. Thos. Beddoes, in the *Medical News and Observations*, London, 1793, in which opium was used with good results. The patient had taken a large quantity of infusion of digitalis, which produced very alarming symptoms. He gave one and a half grains of opium, and repeated the dose in an hour, and afterwards gave fifteen drops of tincture of opium until the patient fell asleep. For two days the patient was critically ill, and had to be kept under the influence of opium.

It seems to me worthy of further investigation to discover the exact relationship between these two drugs, and whether they possess antagonistic properties.

Although it may not be antagonistic to opium, yet I think it can be used with great benefit in opium-poisoning in conjunction

with atropine, as it would counteract the cardiac depression produced by atropine when given in large doses.

R. M. ELLYSON, M.D.

1535 EIGHTH STREET, N. W.,
WASHINGTON, D. C.

RARE COMPLICATION OF MEASLES.

To the Editor of the THERAPEUTIC GAZETTE:

DEAR SIR:—The case reported by Dr. W. P. Ellis in vol. xiv. p. 567 of the GAZETTE, and commented upon by Dr. H. F. Slifer, p. 786, reminds me of a case of subcutaneous emphysema in a 3½-year-old boy, whom I saw two years ago. He was like an air-cushion over the neck, body, and upper extremities. I presume it would have extended to the lower extremities but for treatment. The most remarkable thing about the case was, that it came on in the absence of any violent cough or any known injury, such as a fall or sudden blow upon the thorax. He had only a slight bronchial catarrh, which would have passed entirely unnoticed but for the advent of this phenomenal emphysema. I gave him a sedative cough mixture, and bandaged him comfortably,—extremities, body, and neck. He recovered in a few days.

Very truly yours,

SAMUEL W. KELLEY, M.D.

CLEVELAND, O., December 12, 1890.

Notes and Queries.

A VENEZUELAN PHYSICIAN ON THE TREATMENT OF YELLOW FEVER.

A monograph on yellow fever, by DR. MANUEL DAGNINO, of Maracaibo, Venezuela, has been published at the expense of the municipal authorities. In this work the author describes his usual method of treating the disease. The first thing to do when any suspicion of yellow fever has arisen is to soothe the patient's alarm and put him under as suitable conditions of temperature, ventilation, etc., as possible. The stomach and intestines are usually best cleared out by an emetic and a purgative draught or enema, and a stimulant foot-bath given, followed by massage of the body, and especially of the parts about the waist, practised with oil and spirit. Sinapisms should then be applied, and acetate of ammonia in considerable doses prescribed. Leeches or venesection may be required. Pain about the waist, which is frequently most distressing, may generally be relieved by dry cupping. A quinine, calomel, and rhubarb pill is ordered every two or three hours, and cold or iced acid drinks, and no food allowed for at least three days. In order to combat the black vomit, small and frequent doses of chlorate of potassium with bicarbonate of sodium are very useful. Lime-water, with a minute quantity of opium, is also a valuable remedy, but creosote, which is sometimes recommended, has not seemed to Dr. Dagnino to diminish, but rather to increase, the black vomit. After graduating in 1860, at the University of Caracas, he had no definite ideas on the subject of treatment, and therefore tried for some time various plans as recommended by well-known authorities with most disappointing results. Subsequently becoming satisfied that the liver was the organ mainly affected, he recommenced the routine practice of giving quinine to destroy the virus, and calomel and rhubarb to act on the liver, with the result that for many years he lost only from eight to ten per cent. of his case. A few years after he commenced this plan he heard that an English medical man in the West Indies had adopted somewhat similar methods, giving, however, much larger doses of quinine than Dr. Dagnino considers necessary. Since the introduction of antipyrin he has given it alone or combined with quinine in cases where the temperature has risen to 40° C., as he believes that a very high temperature alone is a fruitful source of accidents in this and all other fevers.—*Lancet*, November 1, 1890.

THE METRIC SYSTEM OF WEIGHTS AND MEASURES.

A committee appointed at the last meeting of the American Association for the Advancement of Science, to aid in the more general adoption of the metric system of weights and measures among professional men, and especially among physicians and pharmacists, has been doing good work, in conjunction with the superintendent of the United States Coast and Geodetic Survey. The above-named committee, consisting of Professor Wm. H. Seaman, M.D., Dr. Fred. Hoffmann, and Professor Robt. B. Warder, has addressed a circular "To Physicians and Professors of Therapeutics, Materia Medica, and Pharmacy," in which the advantages of the metric system are ably presented. There is no

doubt that the metric system is far superior to all other systems, and that it is only a question of time until it will be adopted by the United States government and by all scientific bodies. The committee before mentioned justifies its address to the physicians, and very properly, because of the adoption of the metric system by the convention for the revision of the United States Pharmacopœia, held in Washington in May last. To assist the physician in his effort to adopt the metric system in writing his prescriptions, the following specimen prescription and explanatory statements are given :

METRIC PRESCRIPTION.

℞	Morphinæ sulph.,	0	06
	Chloralis,	6	
	Syrupi,	25	
	Aquæ, ad	100	

Sig.—Tablespoonful every four hours until relieved.

On the back of the prescription-blank may be printed :

METRIC SYSTEM IN MEDICINE.

	Grammes.	Decimals.
1 grain or 1 minim equals	0	06
15 grains or 15 minims equal	1	
1 drachm or 1 fluidrachm equals	4	
1 ounce or 1 fluidounce equals	32	

The cubic centimetre (c.c.) may be considered equal to the gramme for water or aqueous solutions.

Liquids lighter or heavier than water should either be weighed or a proper allowance made.

An ordinary teaspoon, when full, contains five cubic centimetres, a dessertspoon fifteen, and a tablespoon twenty.

Another circular, emanating from the same committee, contains the following table.

For the use of these professions, six lines contain all that is necessary, as follows :

1000 milligrammes make 1 gramme.

1000 grammes or cubic centimetres make 1 kilo or litre.

1000 kilos make 1 ton.

65 milligrammes make 1 grain.

15½ grains make 1 gramme.

31 grammes make one ounce Troy.

In writing prescriptions, a vertical line should be drawn between grammes and milligrammes, all figures on the left read grammes, all on the right to three figures, respectively, deci-, centi-, and milligrammes.

As has already been said, the committee is doing important work, but if physicians are to be guided by the recommendations of the Pharmacopœia in the matter of weights and measures, it would appear that in the matter of nomenclature the same obedience should be accorded it. The Pharmacopœia of 1880 recommends that names of all alkaloids should end in "ina" in place of "ia." Reference to the specimen prescription will show that the committee is ten years behind the times where nomenclature is concerned, while posing as scouts for the army that is to invade the metric territory.—*Pittsburg Medical Review*, November, 1890.

DIGESTION OF FAT.

Two essays that have recently appeared deal with the important subject of the digestion and absorption of fat. MINKOWSKI and ABELMANN have both investigated the effects of entire removal of the pancreas and of the ablation of the greater part of the gland. They find that in dogs totally deprived of the pancreas when meat and bread with milk were given in such quantities as to supply 7 to 24 grammes of nitrogen daily (which represented from 45 to 153 grammes of albumen), forty-four per cent. on the average underwent absorption, the extremes being twenty-two to fifty-eight. In dogs in which a small portion of the gland remained, on an average fifty-four per cent. was absorbed, the extremes being forty to eighty-three, the lowest amount absorbed being always associated with the most imperfect absorption of fat. The albumen of meat was, as in healthy animals, better absorbed than that of milk. The addition of fresh pancreas to the diet caused an immediate rise in the amount of nitrogen absorbed to seventy-four to seventy-eight per cent. of that ingested. Of starchy compounds, which were given to the amount of 151 to 176 grammes *per diem* with the milk and the bread, fifty-seven to seventy-one per cent. was absorbed in animals entirely destitute of a pancreas, while after partial extirpation from seventy-seven to seventy-eight per cent. was absorbed. In regard to oleaginous compounds, it was found that when butter, olive oil, or lipanin, which is a preparation of olive oil, was administered to dogs without a pancreas in proportions varying from 36 to 78 grammes *per diem*, the whole of the fat reappeared in the fæces ; but when fresh pancreas was administered, absorption to the extent of from forty-eight to seventy-three per cent. took place, which is a noteworthy fact. In animals in which partial removal of the pancreas had only been effected, from twenty-five to

fifty-nine per cent. of fats was absorbed, though in these cases of course no fresh pancreas was supplied as food. On milk diet from twenty-eight to fifty-three per cent. of the fats was absorbed in dogs without a pancreas, and in those with some remains of pancreas sixty-five to eighty per cent., whence it appears that all fats, except those of the pancreas, require the presence of pancreatic juice to enable them to be absorbed. It is remarkable that, notwithstanding that the fats were wholly discharged from the economy in cases where the pancreas had been entirely removed, they were in great part—in fact, nearly to the extent of four-fifths—in the state of fatty acids, though partly also in the form of soaps. Minkowski thinks these facts point to an action of the pancreatic juice on the absorbing epithelium of the intestinal canal. It is difficult, however, to accept this theory in view of the absorption of milk in the absence of a pancreas.—*Lancet*, November 22, 1890.

TREATMENT OF CHRONIC DIARRHŒA WITH FLUID EXTRACT OF HYSTRIONICA BAYLEHUEN.

Dr. H. Gilbert, of Hamellsville, N. Y., sends us the following report of these cases of chronic diarrhœa cured through the administration of fluid extract of hystrionica baylehuen :

Case I.—Mrs. H., aged 45 ; consulted in April last for chronic diarrhœa, saying that she had taken various remedies without any material benefit. Her diarrhœa had lasted for about three years. I at first prescribed arsenite of copper, from which she derived some benefit, but she suffered from constant relapses. Some time in June I directed Mrs. H. to take 6 drops of fluid extract of hystrionica baylehuen every six hours. There was marked improvement after one week, after which I ordered 10 drops at same intervals. Improvement was rapid as the 10-drop doses were taken. This patient continued treatment until about two and a half ounces had been taken. At this she considered herself well. I advised her to continue until another ounce had been taken. At this time, December 10, 1890, my patient continues well, and has had no relapse.

Case II.—Mrs. R., aged 47 ; has had chronic diarrhœa for seven years, having from eight to ten stools daily. I had gone through the routine of astringents and alteratives, when I prescribed hystrionica in 10-drop doses at meal-time. Improvement was manifest after one week's treatment. She continued the treatment nearly two months, when her stools became natural, and the patient has continued well up to the present writing.

Case III.—Wm. T., aged 28 ; has had chronic diarrhœa of over three years' duration. When he came to me he was using camphor and opium pills to keep bowels in check, so that he could follow his occupation as shoemaker. I prescribed fluid extract of hystrionica, as in the other cases. Improvement commenced within two weeks after commencing the remedy. I do not know how much this patient took, but think about four ounces. When last seen, in October last, he was perfectly well, and had gained twenty-eight pounds in weight.

I should add here that both Cases I. and II. gained in weight, and, as they expressed themselves, enjoyed the best of health, and this, too, when pursuing their ordinary occupation.

Case I. was a professional nurse and Case II. was a washerwoman. Several other cases of less severity than the above have been cured. I consider the remedy of the utmost value in this disease.

NITROGLYCERIN IN EPILEPSY.

In the *Physician and Surgeon* for December, 1890, Dr. R. R. Lansing states that in the early part of this year he was called to attend a multipara, aged 27, and found her in a severe attack of hystero-epilepsy, which could only be controlled by the use of an anæsthetic, various antispasmodics having been tried without effect. About a month later a second attack came on, in which a hypodermic injection of $\frac{1}{100}$ of a grain of nitroglycerin was administered, and produced entire relief in a few minutes. The next day, it is stated, a slight attack occurred, and was likewise relieved in a similar manner.

There seems in this case, however, to be no proof that the case was one of pure epilepsy, but evidently was of hysterical character. This criticism also applies to the other case detailed, so that, although perhaps Dr. Lansing is entitled to whatever credit there may be in the employment of this remedy in such cases, we hardly think that he has proved that true epilepsy can be relieved by its use. It is not, however, improbable that such might be the case, and it might be worth while to test it in undoubted epileptic attacks.

LIFE-SAVING METHODS IN STILL-BIRTHS.

At the meeting of the New York Academy of Medicine, held December 4, 1890, Dr. W. T. LUSK read a paper with the above title (*Medical Record*, December 13, 1890).

The chief object in presenting the paper was to impress the need of persistent and intelligent application of known methods of procedure. These methods related to the clearing of the respiratory passages of mucus, etc., introducing air into the lungs by catheter, Sylvester's or Schultze's methods, aiding circulation by Schultze's method especially, and stimulating the respiratory centre by the means just mentioned, and also by the application alternately of warm and cold water. It was the manner of applying these well-known means which was all important. By their intelligent use, almost hopeless cases might finally be saved, while by their misuse life had sometimes been needlessly sacrificed.

The following was an illustrative case of successful efforts to save a still-birth: A few weeks ago he was called to the bedside of a primipara in labor. The child's head was in the pelvis, but for the past two hours had made no progress. Extraction of the head by the forceps was easily accomplished. The cord was tight around the neck. This he divided by the scissors, but when the child was extracted respiration had ceased; it was in a state of asphyxia. It was placed upon a table wrapped in warm cloths. The mucus was expelled from the posterior fauces. A No. 8 English catheter was passed into the trachea, and mucus was removed by suction. The quantity of the mucus in the bronchial tubes was large, and the catheter had to be introduced many times. Direct inflation was then practised. In ten minutes heart movements were observed, but they ceased again, and the steps already mentioned had to be repeated. But by perseverance in the treatment they at last observed a little color on the surface of the child. It was then immersed in warm water, lifted out, and cool water sprinkled on the epigastrium. Schultze's method was then practised, followed by Sylvester's. In employing the latter it was necessary to pull the tongue forward, and depress the base. It was not until nearly three hours of constant use of warm baths and cold sprinkling of the surface, alternate resort to Schultze's and Sylvester's methods that respiratory movements were finally established. The next day the child had cramps, but with constant medical attention these ceased after twenty-four hours. It was now in robust health and the joy of a family.

The means for exciting spontaneous respiratory movements should not be selected by divining-rod methods, but by knowledge of physiological law. It was known that during the period of gestation the child remained in a state of apnœa, the respiratory function being performed by the placenta. As soon as the child was born in normal cases the thorax expanded, the diaphragm contracted, and pulmonary respiration was established. The premature establishment of pulmonary respiration while the child was still in the passages was followed by asphyxia and was the usual cause of still-births. Experiments on animals had shown that if, during uterine gestation, placental circulation were suspended, the accumulation of certain materials in the blood was capable of exciting the respiratory centre in the medulla oblongata without the aid of peripheral stimuli, while the latter were capable of exciting the respiratory act before the internal stimuli had increased sufficiently to induce independent action.

At this point the author described the fœtal circulation by diagram.

The conditions which prevailed in asphyxia were somewhat different. When the child breathed *in utero* (and in nearly all cases of asphyxia after birth it had breathed *in utero*), we might say that the intrauterine respiration was due either to tetanic contractions of the uterus (which was not uncommon at a time when ergot was given frequently before detachment of the placenta), to premature death of the mother, and, most common of all, to pressure upon the cord. Pressure upon the cord, cutting off the placental circulation, caused the child, as he had already stated, to breathe *in utero*. The amniotic fluid, meconium, epithelium, and mucus were drawn into the respiratory passages, first into the nose and throat, and, where the inspirations had been active, on down into the trachea and bronchi. There was at the same time increased tension upon the blood-vessels and right side of the heart. As no air reached the lungs, the medulla lost its irritability and the respirations were suspended. At the time respirations were suspended the vessels and the heart were found enormously distended with blood. The lungs were also filled with blood, and when respiration had been well marked, there was pulmonary congestion, pleural ecchymoses, etc.

If the pressure on the cord were only tem-

porary, the fœtal circulation would again resume its way and apnœa return.

In still-births the prognosis depended upon the degree of asphyxia. In milder cases the muscular tone was preserved, the head did not drop, the skin was dusky red or cyanotic, the conjunctivæ were congested, the umbilical vessels distended, reflex movements could be excited by irritation, etc. In these cases respiration often returned. In more advanced cases the head drooped, there was loss of muscular tone, the heart-beats were feeble and infrequent, the umbilical vessels nearly empty, the cutaneous circulation had disappeared, the surface was pale and cold; if respirations occurred they were very feeble, and were not associated with movements of the muscles of the face. The first sign of recovery was refilling of the cutaneous capillaries and regaining of muscular tonicity.

The indications in all cases were to clear out the air-passages, restore the irritability of the medulla, increase the force of the heart-contractions, relieve the plethora of the heart and blood-channels, and expand the thorax. Where muscular tonicity was yet present these conditions were easily fulfilled. But long-continued and careful resort to methods already suggested was called for in the second class of cases.

The author here demonstrated Schultze's method upon the infant cadaver. With the infant's back towards him, the operator placed his thumbs upon the head, the index-fingers in the arm-pits, the hands diagonally across the back, the child's body hanging. Thus pulling up on the thoracic muscles, the upper ribs were drawn upward, while the attachments of the abdominal muscles drew the lower ribs downward, the diaphragm descended, and in this way the cavity of the chest was expanded to the greatest degree, and inspiration was favored. Then, by extending the hands horizontally, and giving a light turn forward and upward, bending the child forward, the abdominal viscera pushed up the diaphragm, the ribs were brought in close contact with one another, and the most efficient form of expiration was produced. There was, perhaps, no other way in which the mucosities in the lungs could be so efficiently expelled. In order to completely ventilate the lungs, the child was swung over between the hands a few turns before being laid away. But the greatest advantage was derived from the manner in which the congested heart-cavities and vessels of the thorax were unloaded by these movements. Where there was deep asphyxia, all movements to restore the child should involve a minimum degree of disturbance; otherwise the heart would cease to act, and all signs of life become extinct. He had known this to occur in several cases. But there was no danger involved in aspirating the lungs through a hard rubber catheter.

TUBERCULOSIS OF THE PERITONEUM.

In the *Deutsches Archiv für Klinische Medicin*, xlvi., Hefte 3 und 4, VIERORDT, whose researches on tuberculosis of the serous membranes are well known, sums up the results of his investigations thus: 1. Subacute and chronic inflammation of the peritoneum is very commonly tubercular. 2. In any single case of chronic peritonitis, of which the etiology is uncertain, one must bear in mind the possibility of tuberculosis. 3. Peritonitis of a non-tubercular character can exhibit symptoms (hectic, wasting condition of abdomen, concomitant affections of other serous membranes) precisely similar to those exhibited by tubercular disease. 4. Therefore, one cannot at once designate a case of chronic peritonitis as tubercular, even if it does exhibit these peculiarities, or even if the characteristic intervals of apparent convalescence, so often seen in the tubercular form, are observed. 5. That tubercular peritonitis can be cured by rest in bed, suitable diet, and other treatment is certain; but if, after a full trial of such treatment, no improvement occurs before the strength of the patient has seriously suffered, laparotomy should be performed. Simple puncture is of no avail. 6. In considering the advantages of laparotomy, distinction must be drawn between incision, with removal of the exudation, and more extensive operations. 7. A simple incision is often successful in suitable cases; such are cases of peritonitis in which the inflammation has spread from some other serous membrane (more especially the pleura), and in which the disease in the first membrane attacked is progressing favorably. 8. Even if there is an active tubercular process progressing in the pleura or pericardium an incision is often beneficial. 9. In all cases it should be a rule, when an incision into the abdomen is made, that a small piece of tissue should be removed for microscopical examination or, if possible, for inoculation experiments.—*Lancet*, November 8, 1890.

CREOLIN: ANTISEPTIC OR TOXIC?

Some important evidence as to the action of creolin on the human subject may be gathered from a thesis on that compound published at Breslau during the course of this year. Dr. Bitter, the author, notes that creolin has already been used in more than two thousand midwifery cases at Breslau. As appears to be the case with nearly every new compound of the kind, the results, according to Drs. Born and Bitter, are most encouraging. In four of the midwifery cases, however, symptoms of poisoning occurred during the administration of a course of creolin injections. Three of the patients were suddenly seized with feelings of restlessness, anxiety, nausea, darkness before the eyes, and a tendency to syncope. The most peculiar feature in these cases was a strong flavor of tea or smoke in the mouth, of which all the patients complained. This symptom lasted for a long time, while the nausea, etc., disappeared immediately upon the discontinuance of the vaginal injections of creolin. The fourth case was more severe; the patient suffered from great restlessness and prostration for several days after the injections were left off. About thirty-six hours after the beginning of the attack the urine, drawn off with the catheter, was very dark and strongly albuminous. Within a few days these symptoms of acute nephritis disappeared. Dr. Bitter advocates creolin as superior to other disinfectants on account of its "relatively" (*sic*) non-poisonous qualities, its excellence as a deodorizer, and its blandness when applied to skin, mucous membranes, and wounds. It neither dries the vaginal mucosa nor causes any contraction of the canal. Creolin has no special hæmostatic action. Dr. Bitter finds that there are disadvantages in creolin, as the emulsions employed for injections are opaque, and the preparation of creolin usually on sale appears to be unstable.—*British Medical Journal*, December 13, 1890.

POISONING BY SULPHONAL.

So much has been said about the safety of sulphonal, and its having no effect upon the heart, that the case reported by Dr. F. H. Dillingham in the *Medical Record* for December 13, 1890, in which alarming symptoms followed the administration of 90 grains by mistake to an elderly lady, is worthy of note.

Dr. Dillingham ordered some powders, each of which contained 30 grains, for insomnia, with directions to take one in the evening. He was called in great haste at three o'clock in the morning, and found the patient in a semi-comatose condition, rapidly passing into a state of stupor, with stertorous breathing. Her radial pulse was almost imperceptible, and extremities cold. It was found that she had taken three powders—ninety grains in all—at 9 P.M. Her breathing and stupor soon improved, and her pulse became a little slower and stronger; inco-ordination of all the muscles was extremely well marked. Her face was drawn slightly to the right side, and there was ptosis of the right eyelid; pupils were normal. At six o'clock in the morning her articulation was very poor, and it was with the greatest difficulty that what she said could be understood. Respirations were 24, pulse 130, and temperature 98° F. Her mouth was parched and tongue dry, and when she put it out it deviated to the right. She had a constant desire to urinate, but passed only about a teaspoonful at a time; the urine was normal. By noon there was a slight improvement in her condition. She had not slept, and her replies were incoherent. The next morning she was much weaker, in spite of the stimulants and milk she had taken, and her mind was not clear. The muscular complications had, however, diminished. There was paralysis of the sphincter ani, so that enemata could not be retained. In the afternoon her mind became clearer, but the inco-ordination was still marked. After this her condition gradually improved, but it was ten days before the ptosis, muscular inco-ordination, paralysis of the face, etc., entirely disappeared. The paralysis of the bladder and bowels continued for two weeks, and then began to gradually resume their normal functions. This case differs from others reported in the distressing effects on the heart, and also in the severity and persistence of the symptoms.

CETRARIN.

Kobert has recently contested the statement that cetrarin, the active principle of Iceland moss, produces an increase in the blood-pressure, while further, his experiments on a large number of animals have shown that this remedy increases the peristaltic movements of the intestines, and is therefore of value in the treatment of chronic constipation. It further is stated to increase the number of the red and the white blood-corpuscles, especially when they have been reduced below normal in various chronic diseases, while,

finally, it is a mild stimulant to the central nervous system. It would appear from these facts that the employment of cetrarin is indicated in chlorotic individuals in whom there is loss of appetite and constipation; the dose being 1½ grains.—*Wiener Medizinische Blätter*, December 11, 1890.

THE MATTISON PRIZE—OPIUM ADDICTION AS RELATED TO RENAL DISEASE—A PRIZE OF FOUR HUNDRED DOLLARS.

With the object of advancing scientific study and settling a now moot question, Dr. J. B. Mattison, of Brooklyn, offers a prize of four hundred dollars for the best paper on "Opium Addiction as related to Renal Disease," based upon these queries:

Will the habitual use of opium, in any form, produce organic renal disease?

If so, what lesion is most likely?

What is the rationale?

The contest is to be open for two years from December 1, 1890, to either sex, and any school or language.

The prize paper is to belong to the American Association for the Cure of Inebriety, and be published in a New York medical journal, *Brooklyn Medical Journal*, and *Journal of Inebriety*.

Other papers presented are to be published in some leading medical journal, as their authors may select.

All papers are to be in possession of the chairman of the Award Committee on or before January 1, 1893.

The Committee of Award will consist of Dr. Alfred L. Loomis, President New York Academy of Medicine, chairman; Drs. H. C. Formad, Philadelphia; Ezra H. Wilson, Brooklyn; Geo. F. Shrady, and Jos. H. Raymond, editor *Brooklyn Medical Journal*.

THE PHYSIOLOGICAL ACTION OF OIL OF PENNYROYAL.

Dr. E. Falk has recently undertaken a number of experiments on rabbits to determine the physiological action of oil of pennyroyal (mentha puleguium) *Les Nouveaux Remèdes*, December 8, 1890).

He found that after either administration by the mouth or subcutaneous injections of from 7½ to 40 drops marked inco-ordination was developed, followed by paralysis of central origin and finally by death. The urine was diminished in quantity, and contained tube-casts and albumen together with leucine and tyrosine.

Post-mortem examination revealed fatty degeneration of the liver and heart, and to a less degree of the kidneys. In most cases blood-pressure was slightly increased, and the pulse slowed; the slowing of pulse being attributable in great part to central stimulation of the pneumogastrics and slightly to peripheral stimulation of these nerves. Fatty degeneration of the abdominal organs and of the heart followed after prolonged administration of the oil in doses of $\frac{1}{15}$ drop daily.

THE LIMITATIONS OF THE CURATIVE LYMPH.

It is now over three months since Professor Koch began the experiments with his lymph upon man. This is almost a sufficient time to determine whether consumption in its earliest stages can be cured. Professor Leyden has treated one hundred and twenty-seven cases, Dr. Guttmann seventy-five cases, and Professor Gerhardt seventy-nine cases. All these are, in addition to the cases first treated, directly under Koch's supervision. Among these two hundred and eighty-one cases, we hear of four deaths, while Dr. Guttmann announces four cures. Most of the remaining cases are simply "doing well."

If any experienced physician were to treat two hundred and eighty-one cases of phthisis in the very initial stage by methods already known there is very little doubt that much better results could be obtained, even within two or three months, than a simple one per cent. of cures. So far, therefore, it must be conceded that Koch's lymph has shown no special remedial power against pulmonary tuberculosis. There is a belief that it is more effective against laryngeal tuberculosis, but we hear as yet of no announced cures.

Its specific effect upon lupus is, so far, quite interesting. Temporary "cures" have certainly been produced by it.

The severest criticisms upon the action of the lymph come, naturally perhaps, from the Paris physicians. Pasteur is quoted as saying,—

"Up to this moment there has not been a single authenticated cure, not even of lupus. Dr. Bergmann himself has seen a patient suffering from lupus return to his hospital fifteen days after having been discharged as cured, a severe relapse having occurred even within that brief interval. Moreover, there is no real certainty as to the consequences of

the treatment. The medicament is of unheard of virulence, and the reactions which it brings on are terrible. No venom from a snake, if administered in such small doses (two tenths of a milligramme), could cause such results. We have therefore a toxic of such indomitable energy that it may introduce into the organism disorders the consequences of which no one can surmise, and have yet to be studied. You may have seen a report in the medical papers of yesterday that albuminuria and hæmaturia have been found in a patient who had been treated for tuberculosis to very small doses of this lymph. In fact, it is the kidneys that are particularly affected by it."

Pasteur, referring to the early publicity given to Koch's method of cure, says, in conclusion,—

"Whatever happens, you may be perfectly certain that the École Bactériologique Française will not imitate their example. So long as the results of its investigations are unascertained we shall be silent. So soon as a single point shall have been perfectly established we will report the fact in detail to the Académie de Médecine."—*Medical Record*, December 27, 1890.

TREATMENT OF SCABIES WITH CREOLIN.

According to the *Internationale Klinische Rundschau* for November 16, 1890, Dr. De Lollis employed creolin, in the form of a five per cent. vaseline ointment, in cases of scabies, rubbing it once daily into the affected parts. He claims that, as a rule, only four such applications are necessary to produce perfect cure. Creolin, in the author's opinion, is preferable to any other remedy for this purpose, especially possessing the advantage over sulphur in not producing any eczema of the skin, and not staining either the skin or the linen.

SOME NEW APPLICATIONS OF SILICATE OF SODA.

At the meeting of the Southern Surgical and Gynæcological Association held in Atlanta, November 11, 12, and 13, 1890, Dr. George A. Baxter, of Chattanooga, read a paper in which he said that the jacket of packed silicate of sodium possessed all the qualities to be found in a plaster jacket both of firmness and support, while weighing only one pound and six ounces (*New York Medical Journal*, December 27, 1890).

It was neater in appearance and finish, and could be perforated like leather for ventilation, which plaster could not. It was even lighter than leather without its costly process of construction, and had the same advantage over the woven wire jacket, with the additional advantage over both these latter and all others of this class, that it could be constructed by any surgeon at any time or in any place. The patient was suspended and a plaster jacket roughly placed around her and cut as soon as it had hardened enough to retain its shape, thereby lessening materially the time of suspension, the most trying ordeal with this or the plaster, and not without its dangers when long continued; the cut edges were bound together where it had been cut down directly in front with cords, and then a core of paper placed in the centre. This paper core was used for two reasons: (1) to lighten the cast and take as little plaster as possible, and (2) to dry it the more readily by heating the inside. This done, the plaster was poured around the core and inside the cast, which gave him a mould of the body in extension and counter-extension, exact in every respect. Around this was made the silicate jacket after the manner of the plaster roller bandage, weaving half-inch metal strips in the meshes of the bandage at a distance of four inches apart around the whole cast, an inside lining of a knit shirt having been first placed over the cast. The whole was then placed over a coal-oil stove and allowed to dry out, which it did in from half an hour to two hours or less, especially if the cast had been previously dried. This process of heating not only dried the silicate, but baked it as well, rendered it impervious to the action of water or the perspiration, and gave it sufficient strength to allow of its being perforated for ventilation. It was then cut from the mould with a straight incision down the centre, two pieces of leather, to which button-hooks or eyelets had been previously attached, were sewed up and down the front on each side, then the whole could be laced up solid or loosened and taken off at will. The necessity of taking off a jacket or leaving it on during the whole course of treatment would, of course, depend upon the character of the disease or the injury under treatment.